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CONTENTS

The American Association for the Advancement of Science:—
Section F—Is it Worth While? PROFESSOR HENRY F. NACHTRIEB 199

Extracts from the Thirty-third Annual Report of the Director of the United States Geological Survey: DR. GEORGE OTIS SMITH 205

The Transcontinental Excursion of the American Geographical Society: PROFESSOR ALBERT PERRY BRIGHAM 210

Scientific Notes and News 214

University and Educational News 218

Discussion and Correspondence:—
Conn's Biology: DR. FREDERICK H. BLODGETT, PROFESSOR T. D. A. COCKERELL. *On the Reform of the Calendar:* J. M. CLIFFORD, JR. 218

Scientific Books:—
Sanderson and Jackson's Elementary Entomology: PROFESSOR C. R. CROSBY. *Bjerknes and Sandström's Dynamic Meteorology and Hydrography:* DR. F. R. SHARPE. *Whetham's Experimental Electricity:* PROFESSOR O. W. RICHARDSON 220

Special Articles:—
Relationship of the Indian Languages of California: PROFESSORS R. B. DIXON and A. L. KROEBER. *Critical Criteria on Basin-range Structure:* DR. CHARLES R. KEYES. *The Relation of Age to Fecundity:* DR. RAYMOND PEARL. *The Induction of Non-astringency in Persimmons at Supranormal Pressures of Carbon Dioxide:* PROFESSOR FRANCIS E. LLOYD 225

The American Physiological Society: PROFESSOR JOSEPH ERLANGER. 232

The Association of American Geographers: PROFESSOR ISAIAH BOWMAN 235

The Convention of the American Society of Agricultural Engineers: PROFESSOR I. W. DICKERSON 235

Societies and Academies:—
The Anthropological Society of Washington: W. H. BABCOCK 236

MSS. intended for publication and books, etc., intended for review should be sent to Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SECTION F—IS IT WORTH WHILE?[1]

THE first meeting of the American Association for the Advancement of Science was held in September, 1848. The society was not then organized into sections, but a committee on organization was empowered to "divide up sections" or "combine sections" as it deemed advisable.

The *Proceedings* of the Association indicate that for many years this committee was at least an active one, for the particular organization into sections and subsections of any one meeting rarely survived for another meeting.

At the sixth meeting, held in August, 1851, the following sections were recognized: A—Mathematics and Physics, B—Chemistry and Mineralogy, C—Geology and Physical Geography, D—Natural History, including Physiology, E—Ethnology and Geography, and F—Mechanical Science.

At the seventh meeting held in July, 1853, botany and zoology were recognized as subsections of Section B, which had been changed from "Natural History including Physiology" to "Chemistry and Natural History." The next year zoology was conspicuous by its absence, but two zoological papers were read in the subdivision designated "Physiology." The year following "Physiology" was omitted and "Zoology" was reinstated. Thus zoology, now prominent and now not in evidence, drifted in

[1] Address of the vice-president and chairman of Section F—Zoology—American Association for the Advancement of Science, Cleveland, December, 1912.

and out down to the thirty-first meeting held at Montreal in August, 1882. At this meeting "Biology," including botany and zoology, was designated as Section F and "Histology and Microscopy" as Section G.

For ten years the twins—botany and zoology—constituted Section F. At the forty-second meeting held at Madison, Wisconsin, in August, 1893, the twins parted company, zoology becoming Section F and botany, Section G. The Vice-president of Section F was Henry F. Osborn, who delivered the first vice-presidential address before the section. The secretary of the section was L. O. Howard.

But few vice-presidents have failed to follow the example of Vice-president Osborn. Two years ago sickness prevented the vice-president attending the meeting held at Minneapolis, but his address was read by another member of the section. Last year the vice-presidential address was omitted from the program because Vice-president Reighard and the other officers were convinced that but few zoologists would attend the Washington meeting. Their judgment was vindicated in so far as the number in attendance can be considered a vindication.

On the whole, the record of Section F as preserved in the *Proceedings* of the Association is very creditable and can hardly be called discouraging. Moreover, the list of zoologists who have taken an active part in the meetings of the association includes the names of most of our eminent and honored zoologists.

Why then ask you to consider whether it is worth our time and energy to maintain Section F as an active, vital unit in the Association?

Well, Section F can be thought of as an organism—at least it is an organization composed of living animal units—and I dare say it is no reflection upon you to assume that as zoologists we are all interested in living things and their functions and all the conditions that affect their vitality and effectiveness. But let me put you at ease, so far as I can, by assuring you that I am not going to tire you with an effort to work out this figure in detail.

The immediate suggestion and justification for my apparent disregard of the traditional character of vice-presidential addresses lie in the unrecorded facts pertinent to the life of Section F and in the attitude of indifference to and even open repudiation of the section assumed by some zoologists in recent years. It may be that the phenomena interpreted as evidences of destructive metabolism are merely expressions of efforts at readjustment. If so, I hope I shall be considered among those who desire a proper readjustment. If, on the other hand, the phenomena are indications of a real tendency toward disintegration, I trust I may have some part in at least checking that tendency long enough to enable us to come to a full realization of what disintegration of the section would mean for zoology in general.

Bear with me, then, while I bring to you some of the facts and observations which have a bearing upon the position of Section F as I see it.

Section F, as already stated, was organized in 1893. The objects of the section, as expressed in the constitution of the Association, are:

> by periodical and migratory meetings, to promote intercourse between those who are cultivating science in different parts of America, to give a stronger and more general impulse and more systematic direction to scientific research, and to procure for the labors of scientific men increased facilities and a wider usefulness.

The American Society of Naturalists was organized in 1883 with the object of associating

working naturalists for the discussion of methods of instruction, museum administration, and other objects of general interest to investigators and teachers of natural science; and for the adoption of such measures as shall tend to the advancement and diffusion of the knowledge of natural science.

The list of meeting places of this society clearly indicates that the society practically has been an eastern organization. The addresses and discussions, in so far as one can judge by their titles, indicate that some of the objects announced in section 2 of the constitution either have been overlooked or are not what the language of the section suggests.

In 1899 a call was issued to the naturalists of the central and western states to meet at Chicago for the purpose of considering the organization of a western branch of the American Society of Naturalists. This meeting was so encouraging that another meeting was held at the University of Chicago in 1900. The second gathering was even more successful than the first. Indeed it was so large that, in the language of the minutes, it "became necessary to hold two sections, a zoological and a botanical."

The segregation thus forced upon the botanists and zoologists in 1900 was again observed in 1901, when the Eastern Branch and the Central Branch of the American Society of Naturalists and the American Morphological Society met at the University of Chicago. At this meeting the zoologists appointed a committee on organization and during Convocation Week of 1902–03 organized the American Society of Zoologists, consisting of an Eastern Branch and a Central Branch. The constitution of this society declares the objects to be

> the association of workers in the field of zoology for the presentation and discussion of new or important facts and problems in that department of science and for the adoption of such measures as shall tend to the advancement of investigation in that science in this country.

The scope of the society is further indicated by the restriction of membership to "active workers in the field of zoology and who have contributed to the advancement of the science."

The American Morphological Society was organized in 1890 in recognition of "a very noticeable increase in the number of persons in this country who are devoting themselves to the study of animal morphology," and also with a desire to break up the "scientific isolation" resulting from "the vast extent of territory over which our students are scattered." From the beginning this society was distinctively eastern, notwithstanding the fact that it recognized the vastness of our territory and expressed a desire to break up "scientific isolation."

In addition to the above there have been organized since the establishment of Section F, the American Association of Anatomists, the American Society of Biological Chemists, two societies of entomologists, the American Nature-study Society, the American Physiological Society, the American Psychological Association, the American Association of Museums and the American Breeders Association with a special section on eugenics. Each of these organizations has come into existence in response to a demand and each has some specific and circumscribed end or ends in view. All have drawn from the group of workers that but about twenty years ago constituted Section F. Membership in some of them naturally means separation from Section F, while membership in others ought to just as naturally mean active membership in Section F. For even when, as I have intimated, the declared objects of these organizations suggest a field of usefulness outside of the circle of the select

few the records do not suggest any activity beyond the circle. This is quite natural and under our conditions is inevitable.

I trust you will not misinterpret my brief comments on the declared objects of these societies. I am not criticizing, but am trying to present as briefly as possible some of the important facts and conditions that have a bearing upon my question.

Apparently there is still a demand for these organizations. All of them emphasize the fact that specialization and segregating grouping has become necessary. I dare say none of us will deny that the segregation of specialists is a natural process and that we shall always have the groups now organized, or others to be established as our points of view and interest shift. You may regret it and to some extent even rebel against it, but you can not ignore it and have a part in the progress of science. In yielding to this pressure, however, we may go to such an extreme as to fall far short of legitimate expectations. And I am constrained to declare that the tendency of eminent zoologists to ignore Section F and even to speak slightingly of it indicates a sad misconception of our relations to society at large.

Only the declaration of the American Society of Naturalists to adopt such measures as shall tend to the advancement and diffusion of the knowledge of natural science indicates a recognition of our obligations to all our fellow-citizens that is somewhat differently suggested in the "increased facilities and a wider usefulness . . . for the labors of scientific men" of the American Association for the Advancement of Science.

Neither the Society of Naturalists nor Section F has lived up to the program of general usefulness. The addresses, and quite naturally the papers, have been prepared with reference to the zoologists within the circle rather than with reference to those who are not specialists and in whom we should foster and develop an interest in the science for the general good.

In this, I think, lies the suggestion of the point where we shall discover our weakness and the hope for a wider influence and usefulness.

The Society of Naturalists can not be justified unless it really is what the name intimates, and under the present system of organizations and affiliations its meetings can not truly be meetings of naturalists unless the botanists, zoologists and other naturalists meet at the same place and time. The botanists have kept in close touch with Section G of the Association, but the zoologists have recently tended toward independence and separation from Section F by making the meeting places of the association a minor factor in the selection of the meeting places of their societies.

Are there any reasons why zoologists should emulate the example of the botanists and show a keener interest in the possibilities of Section F? I think there are, and I shall try to present one that has been uppermost in my thoughts recently.

I shall not enumerate the social and personal advantages of meeting at the same time and place set for numerous other scientific societies and sections of the association. These advantages have been fully presented and without doubt are admitted by all of us. At present there is uppermost in my mind just one point of view, namely, Section F as the zoologists' natural avenue to the general public.

As a foundation for my plea for a wider usefulness of Section F, I postulate the following two propositions:

1. No scientific organization in this country receives such general attention and, for a time at least, creates so widespread an interest in human knowledge

and achievement as does the American Association for the Advancement of Science.

2. Every department of science that appears as a part of the association at its meetings shares this touch with the general public in proportion to its activity and the interest it expresses in the public at large.

In my judgment these propositions are statements of facts and not inferences. Accordingly, I leave them without attempting to support them by argument, and ask: Can we as zoologists afford to ignore—nay, are we doing our full duty when we give little or no thought to our possible influence outside of the circle of our laboratories?

When I see men and women rushing from city to city or racing across the continent in automobiles in search of health or invigorating "rest," I soften my judgment with the fond hope that some day the zoologists and botanists of our universities, colleges and normal schools will send out teachers prepared to plant in the heart of every school boy and girl a love for nature that will become a heritage to be handed down from generation to generation as an invaluable asset for the health and happiness of the race.

Of course, the realization of this hope will not come until it is much more generally appreciated that, nature not being man-made, communion with her in "God's out-of-doors" compels man to leave the worn paths of human activity and diverts his attention to the things that are ever attractive and vitalizing. There are relatively few of us who are teachers, and still fewer of those who are preeminently investigators, giving due weight to this point of view. As a rule zoologists are either ignorant of or indifferent to the opportunity open to them for service in this direction, and in consequence are failing to fully discharge their sacred obligations to society.

Everywhere I find among thinking men and women a strong undertone of an unexpressed, an uncrystallized sentiment that for some reason or other zoology is not meeting a demand that ought to—that must exist in the best civilization. And whenever I have outlined a plan of what might be called natural history courses designed especially for teachers and prospective teachers, I have been most enthusiastically urged to carry out the plan and provide something similar for the students who are not selecting zoology or botany as the major line of work.

The love of living things as individuals in a community is inseparable from the social or gregarious instinct. And when we have reached years of discretion and instinctively seize essentials, letting go the non-essentials, we are still children at heart. The child humanizes the actions of the animals that come into its experience and names them as spontaneously as it does the cousins, uncles and aunts. And no matter how absorbed we may become in chromosomes, we are content and happy only when we call the animals we see and hear by name. The intellect may find satisfaction in the contemplation of the obscure and the abstract but the man of heart must have the concrete individual.

I venture to assert that every successful teacher of zoology who awakens an active interest in animal life and who fosters a love for nature is successful by virtue of his personal experience with animals in their native environment. A class tired and weary of the scientific discussion of a morphological or embryological question can be put on the *qui vive* any time with a story personal to some particular animal or group of animals. Time and time again I have seen students weary unto sleepiness awakened and kept awake for an hour by an account of a simple but personal ex-

perience with some animal. What teacher has not been struck by the tenacity and even accuracy with which students hold the accounts of personal experiences and the lessons drawn from them when their minds were like quicksand for morphological data!

But let us be honest with ourselves and remind ourselves that most of our students go out to give in miniature or in more or less condensed form what we give them in our laboratories and lecture rooms. The kind of zoology to which the great majority of the coming generation is to be introduced will be largely, if not altogether, determined in our universities and colleges by the men and women who constitute the membership of Section F and affiliated societies.

It should also be remembered that the wider the circle of those interested in a science the greater will be the appreciation of the work and efforts of the investigators in that field and the greater will be the possibilities in every direction. To take thought of service to the general public through our general courses in zoology from the schools to the colleges and universities and through such natural avenues to the public as Section F, is to indirectly but certainly increase the appreciation and support of all lines of zoological investigation and to give the investigator, as well as the teacher, in the field of zoology a more honored and generously supported position. Consequently, in view of the unique position I have assigned to Section F it is natural for me to bespeak a warmer interest in the section and a sympathetic cooperation for the officers.

Before concluding my brief plea permit me to protect myself against a possible misunderstanding. My plea is for Section F and the recognition of a need which I feel most of us do not recognize in service. In the presentation of this need and opportunity I am not decrying our present type of university course in general zoology. Neither do I advocate nor believe in replacing the usual university course in general zoology by a so-called old-fashioned natural history course or what some of the younger protestors are pleased to call ecology. No, I believe in what we may call the morphological course illuminated with a common-sense presentation of the machine in action and in its becoming. A critical examination of conditions I think will disclose as a fact that the protesting zoologists are misplacing their criticisms. The general dissatisfaction we hear about (which probably is not as general as some think it is) is not so much a result of the character of the courses offered as it is of the quality of our students. The courses, as a rule, are fit and proper and not a bit too exacting for a student of university caliber. But many of our students are not of university caliber in reference to zoology. That is the weak link in the chain. Our students should come from the high schools, preparatory schools and minor colleges with a better knowledge of animals as living individuals and with more knowledge of the physical sciences. But many of them come without any of this knowledge or with the background of a nature-study course often worse than nothing.

To crowd out of the university the exacting morphological course with a gossipy informational course of the hunter and fisherman and superficial poet is to replace sound learning and the development of mental fiber and capacity with sentimentality and undifferentiated—aye, undifferentiable protoplasm in the brain. We must not lower our standards and ideals to those of the vaudeville nor those of the moving picture shows nor those of the newspapers and current novels, but we must insist

upon keeping them up and do our best to make possible the proper preparation of the students.

With teachers prepared to teach zoology as probably we all feel it should be taught in our schools, and consequently with our students quite ready for a deeper look into animal life, and with a more widely distributed interest in zoological work, we shall find the more or less vague feeling for something that is wanting vanished and shall have a larger and more capable class of applicants for more special and advanced courses. Until this condition is realized we must as best we can provide for both classes of our students as well as for the preparation of the men and women who are to bring the rich blessing of a general interest in natural history to the commonwealth.

In the progress toward the realization of this worthy end Section F, in my humble judgment, can be made a most efficient factor by serving as the one sure and safe link between the general public and the zoologists as investigators and teachers.

The preparation being well done below the plane of the investigator, or, if you prefer, outside the circle of investigators, Section F will continue as a vigorous branch of a fruitful vine, and, being trained to meet the conditions of its general environment will yield to the people at large attractive, choice and satisfying fruit.

H. F. NACHTRIEB

THE UNITED STATES GEOLOGICAL SURVEY[1]

THE record of the work of the Geological Survey during the fiscal year 1912 may fitly be preceded by a statement of the conditions under which that work has been done, not as an apology for either the quantity or quality of the results of the investigations made, but rather as an exhibit of the limitations forced upon this bureau —limitations on economy and efficiency which seriously hamper all efforts for better administration in the expenditure of public money.

The offices of the Geological Survey have become wholly inadequate and unadapted to its needs. Since 1884, when the Survey was first quartered in the Hooe Building, at 1330 F Street, the effort has been frequently made to provide for the growth of the organization by adding wings and extensions to the building, but every increase in floor space has been made at the expense of proper lighting of the older portions of the building, so that its fitness for the Survey's use has been steadily impaired, and the resultant conditions constitute an actual detriment to health and a menace to life and property, as well as an obstacle to efficiency. The conditions under which the Survey employees work in the Washington office are to be condemned for both humanitarian and business reasons. . . .

The present housing of this federal bureau is unworthy of the nation. Both the work and the workers of the United States Geological Survey have an international reputation, and visiting foreign scientists do not conceal their astonishment at the miserable environment in which these investigations are being carried on. Our neighbors on this continent, in Canada and Mexico, have erected buildings especially adapted to the work of their geological surveys, which are properly housed, as is nearly every other geological survey in the world, and yet the geological survey of no other nation compares in size of organization or scope of work with that of the United States. In fact, the surveys of several of the larger European countries are organizations whose personnel is com-

[1] Extracts from the Thirty-third Annual Report of the Director.

parable in number only with that of single divisions of the American Survey.

The practical side of this feature is the increased inducement that suitable quarters would afford in retaining in the government service men of the highest professional talent. At best, most of these investigators are carrying on their government work at a financial sacrifice, and the temptation to go into professional or corporation work at largely increased salaries is strengthened by the contrast between the well-lighted and sanitary offices generally provided in the business world and the noisy, dirty, dark and crowded quarters offered by the Survey. To retain in the government service the best men is by far the largest administrative problem of the director of the United States Geological Survey.

Notwithstanding the growth of the Survey work along practical economic lines, scientific work has not been neglected. In fact, in the Geological Survey the scientific investigations are inseparable from the economic work, though the one or the other may predominate in purpose according to the needs of the particular research in hand. In any field economic work of the highest rank is impossible without full knowledge of the scientific laws and principles pertaining to the subject of the work; but as there is no application of geology which does not involve unsolved problems, some of them of the highest importance, the best knowledge available is nevertheless relative. It thus follows that the broad and searching observations which should accompany every piece of good economic work comprehend data that are eventually combined in the construction of new scientific hypotheses, some of which, as more observations accumulate, grow into established laws or principles that are in turn of the greatest practical consequence. Thus the detailed studies of the metalliferous deposits in one region or another bring to light evidence from which to determine the genesis of the ores and the modes or conditions of their occurrence, and the economic inquiry becomes more intelligent and successful when once this new principle regarding the mode of an ore occurrence is understood.

On account of the plain duty of this federal service to minister to the immediate needs of the various mining districts, it is not generally possible to concentrate and direct the observations to a series of regions systematically chosen as suited soonest to furnish the requisite data bearing especially on some particular scientific problem, however important and advantageous its solution may be; but nevertheless the data are gradually accumulated for the interpretation of many of these problems without sacrifice of the Survey's obligations to the public. An interesting illustration of the deduction of a principle from data so accumulated is found in the paper by W. H. Emmons on the enrichment of sulphide ores, the manuscript of which has been completed during this year. Another illustration of scientific results based on a long period of field studies, pertaining mainly to economic areas, is found in the pre-Paleozoic history of central North America, as described in the monograph by Van Hise and Leith on the geology of the Lake Superior region, which appeared during the year.

Among other long-term studies more distinctly scientific in character may be mentioned particularly the investigations, made under Mr. Vaughan's direction, of the formations of the southern Coastal Plain and Gulf embayment, which, though having an economic object, are yielding important contributions to our knowledge of the stratigraphy, physiography and

geologic history of this province; the work under the direction of Mr. Cross in the San Juan region of southwestern Colorado, which, in connection with the thorough geologic studies made during the preparation of folios, is affording new scientific results of a higher order concerning especially the volcanism and physiography of the region; and the studies begun last year by Messrs. Campbell and Alden in the Glacier National Park, which promise important results concerning the origin of the structure and physiography of this part of the Rocky Mountains and of the glacial topography, which, as it is still "in the making," offers exceptional opportunities for scientific study as well as observation by the traveler interested in the natural wonders of his own country. Important regional studies of high scientific rank which should also be mentioned are those prosecuted by Mr. Keith and his associates, on the difficult stratigraphy and intricate geologic structure of the older Paleozoic regions of western New England and the Appalachian region, the results of which are partly published in folio texts, and those carried on by Professor Emerson in southern New England. A report by Professor Emerson on the geology of Massachusetts and Rhode Island has been submitted during the year.

The paleontologic work of the Survey continues to be of the highest rank. Many of its publications, written by the most distinguished representatives of the various branches of paleontology in the country and embodying experience and observations gathered during years of patient research, have contributed much to the scientific reputation of the organization. The descriptive paleontologic papers are often treated as "pure science," yet instructive, striking or tedious, as may be these delineations of the groups of animal or plant life which lived on the globe in some particular epoch, there is not one of these papers describing the fauna or flora of a formation that does not prove sooner or later to possess practical value and to be essential to geology in its constantly increasing refinement of study and results. Without paleontology the geologic classification of formations, their correlation, and the determination of their mutual relations would be impossible. In fact, real and symmetrical progress in geology is impossible without corresponding interrelated development and refinement of its handmaid paleontology. The economic geology of any region of complicated structure is blind and inconsequent unless the time relations of the strata concerned are known. The monograph now being issued from the press on the Cambrian Brachiopoda, prepared by ex-Director Walcott and representing many years of painstaking study and distinguished attainment, embraces our best and most complete presentation of the criteria for the discrimination of the Cambrian formations in America and will for many years be a manual for the use of workers in Cambrian geology and paleontology. This monograph brings deserved credit to American science and to the Geological Survey, under whose auspices most of the work was accomplished. Other paleontologic publications specially deserving mention by reason of their scientific merit are J. P. Smith's philosophic treatment of the Middle Triassic faunas, and the monograph on the Mesozoic and Cenozoic Echinodermata of the United States by W. B. Clark and M. W. Twitchell, the manuscripts for both of which are now in hand. Work like that of Kindle on the Onondaga fauna, lately printed, and that by Berry on the Upper Cretaceous and Eocene floras of South Carolina and Georgia and by Stephenson on the Cretaceous deposits of the eastern Gulf region,

both now in manuscript, is indispensable to geology. In these papers the stratigraphic value and the practical application of the results of the paleontologic investigations are given much prominence. The two papers last named are based on materials gathered in the course of the study of the Coastal Plain already mentioned, the economic motive for which was the investigation of the underground water resources. They are therefore representative of a series of scientific reports resulting from studies whose immediate object is economic.

The folios describing and mapping in detail the geology of quadrangles in different parts of the country are regarded as mainly scientific, though always giving attention to the economic resources of the region. The areal studies now in progress in the valley region of central Alabama, a part of which has been described by Mr. Butts in the Bessemer-Vandiver and Montevallo-Columbiana folios, now in hand, promise important additions to the geologic history of the southern Appalachian region. On the other hand, the Claysville (Pennsylvania) folio, which has been issued during the year, affords a striking example of the first-hand aid in oil and gas development to be derived from the careful delineation of geologic structure and its economic explanation. Not inferior in scientific value to the papers just cited, though primarily economic, are such reports as those by Messrs. Brooks and Prindle on the Mount McKinley region, Alaska, and by Messrs. Calkins and Emmons on the geology and ore deposits of the Philipsburg quadrangle, in Montana.

An important and interesting effect upon the scientific work of the Survey has resulted from the work in land classification. The constantly increasing demand for both completeness and exactness of information regarding the mineral resources of the public lands under classification have developed methods and scope of view in this economic work that have exerted a marked influence on the folio work in other areas.

Thus, the training and methods developed in the course of the classification of the coal lands have brought about higher standards of refinement in stratigraphy, as well as in economic work, in other regions of the country. Another very notable illustration of scientific results springing from the study of economic problems is found in the administration of the Weeks Act. The intensive hydrometric experimental studies carried on in order actually to show, in accordance with the terms of the law, the degree of protection afforded by forests to soil and water in certain areas proposed for purchase as national forests have resulted in empirical determinations and demonstrations of high scientific value as well as of tangible economic importance.

The principles governing the origin and mode of occurrence of petroleum and natural gas are as yet but fragmentarily grasped. Every oil field examined in detail contributes its data for use in the eventual interpretation of the problems, and each pool is studied with keen alertness for the discovery of some key which may aid in the coordination of the data, which sometimes, according to the region and conditions, seem, on account of our lack of knowledge, even to be in conflict. The observations made by the survey geologists in the oil and gas fields of California and Kentucky promise to further the solution of some of the problems, and by pointing out the relations of oil and gas occurrence to the geologic structure of the regions examined they have rendered important scientific as well as economic aid in oil and gas development; but the basic

principles controlling the widely varied modes of occurrence and accounting for the differences in kinds of the oils in widely separated regions are possibly still far from view.

On account of the more conservative and dignified character of the official publications of the Survey and the care taken to confine their substance to matters of demonstrated fact, they do not offer to the geologist the forum for free discussion of scientific theories and problems that are afforded by those periodicals and serial publications of scientific societies which are especially devoted to matters of strictly professional interest and which are more widely distributed among scientists. For this reason many of the scientific results of the Survey's operations are first published in these journals. Examples of papers of high rank contributed in this way are numerous. Without implying relative merit among these, mention as typical may be made of the paper by Mr. Campbell, "Historical Review of Theories Advanced by American Geologists to Account for the Origin and Accumulation of Soil," published in *Economic Geology*, Vol. 6, No. 4, and that by Mr. Ulrich, entitled "Revision of the Paleozoic Systems," printed in the *Bulletin of the Geological Society of America*, Vol. 22, No. 3. Besides contributing to the programs of other scientific societies in Washington, the members of the Survey maintain for the discussion of purely geologic topics three professional societies, including the Geological Society of Washington, before which Mr. Campbell's paper, just cited, was presented as a presidential address. Meetings of some one of these societies or of their sections average two a week for the winter and by far the greater number of the papers read are offered by members of the Survey.

EDUCATIONAL WORK OF THE SURVEY

Closely connected with the scientific work of the Survey is its educational function, which has not, on the whole, received the attention that so importantly useful a work deserves. The Survey has, however, in cooperation with several state surveys, participated in the preparation of a number of educational bulletins that have, in accordance with the agreements, been submitted to the respective states for publication. As distinctly educational in their scope, though far from elementary, should be named the valuable paper by Mr. Willis, entitled "Index to the Stratigraphy of North America," published as a professional paper in explanation of the new geologic map of the continent, and the paper by Messrs. Tarr and Martin, describing the earthquake phenomena in the region of Yakutat Bay, Alaska.

A notable contribution to the study of physiography was the Survey's Professional Paper 60, "The Interpretation of Topographic Maps," by R. D. Salisbury and W. W. Atwood, consisting chiefly of reprints of parts of the Survey's maps and of brief suggestions as to the origin and history of the features shown on them. For many years the topographic maps made by the Survey have been regularly used in the courses of instruction in geography and physiography in most of the universities and colleges and to some extent in the secondary schools. It is very gratifying to note that the maps prepared in accordance with the present high standard, and more fully adapted to such use, are coming to the attention of teachers in the graded and country schools. Teachers of schools located in the quadrangles surveyed in recent years find the corresponding topographic sheets a most practical and invaluable aid to their efficiency and success in teaching elementary geography.

THE TRANSCONTINENTAL EXCURSION OF THE AMERICAN GEOGRAPHICAL SOCIETY

On the evening of August 21 there was gathered at dinner at the Harvard University Club in New York City a somewhat unusual company. Of those present forty-three were European geographers, representing fourteen different countries. There were also present about a dozen Americans, and all together were making the beginnings of acquaintance and friendship which in many cases will be lifelong. The occasion of the excursion was the completion on upper Broadway of the American Geographical Society's splendid new building. Though unannounced, it is well understood that the two months of journeying which followed was made possible through the munificence of the president of the society. The party had been organized, and the excursion was directed by Professor W. M. Davis, of Harvard University. The start was made from the Grand Central Station at 8:30 on the following morning. The special train was made up of two Pullman cars, two Pullman observation cars, a diner and a baggage car. There was also usually attached to the train a private car accompanied by some official of the several railways along which the route was taken. These officials were usually in charge of the land holdings and of the industrial operations which are now so largely promoted by our great railway systems in the west and the south. They are accomplished men and gave to the party many valuable lectures and conversations throwing light upon the development of their respective regions. A very complete outfit of maps had been provided, and the map expert of the society hung in the observation cars large and small scale maps appropriate to the regions through which we were passing daily. There were also considerable libraries, made up of the books and papers of the American members of the party and of the reports of the Geological and Geographical Surveys of the United States, and of the various commonwealths.

It would not be easy to define in a single sentence the object and work of the excursion. The main aim, of course, was for every man to get as much first-hand knowledge about the United States as possible. This was attained in many ways. There were considerable observations from the car windows so long as daylight prevailed, and there were many stops, sometimes two or three in a day, for special features of the physical geography. Thus, in Fishkill, a little more than an hour out of New York, the party alighted from the train and ascended by the cable car to the summit of the highlands, where one of the American members interpreted the topography of the mountains, and the industrial and commercial interests of the Hudson River lowlands as they spread out northward towards Albany. At Little Falls a brief stop was made. The Dolgeville railway was ascended to the top of the cliffs and the topography and history of the Mohawk Valley were briefly described, and a representative of the state engineer's office added an account of the Barge Canal. At Syracuse the party was taken by automobiles southward from the city to see on the hills the abandoned river channels and fossil Niagaras of the closing stages of the glacial time. On the banks of the Mississippi River in the early morning the train stopped for an hour while the party scrambled to the top of the bluffs to look out over the delta of the Chippewa, and the ponded waters of Lake Pepin. The topography around San Francisco was seen by a long walk through the rift valley, marked by the earthquake movements of 1906, and also by the railway ascent to the summit of Mount Tamalpais, whose magnificent panorama includes the city, the Golden Gate, San Francisco Bay and broad stretches of the Valley of California. At Loch Ivanhoe, in Colorado, the train stopped at the western entrance of the tunnel, and the party walked over the Hagerman Pass of the Continental Divide, rejoining the train at the other end of the tunnel. At Asheville, one of the local summits of the Appalachians was reached by automobile and here lunch was taken looking out upon the wilderness of peaks and endless forests that characterize the mountains of North Carolina.

In addition to daily studies of the physical features from the train and by special excursions, a great deal of attention was given to the phases of economic and industrial development, for it is recognized by all true geographers, and it is especially emphasized by the geographers of Europe, that the science does not come to its full fruition until it has taken in, not only the lands, but the interests and relations of those who live upon them. Every one knows that a wide field for such study is open to one who crosses our continent.

From Buffalo the party visited the Lackawanna steel plant and for an hour or more were transported up and down among the various buildings and furnaces upon flat cars provided by the company. At Niagara one afternoon was devoted to the power house and the various industries, and the whole of the following day given to the falls and the gorge, with many stops and brief lectures from experts by the way. In Chicago the party inspected in squads, according to their choice, the Stock Yards, the business methods of the Sears, Roebuck Company and the map-making plant of the Rand-McNally Company. A day was spent in the great open air iron pits of Hibbing, Minnesota, where again the party was transported by many miles of zig-zagging in a train of open cars to all levels of this greatest of iron mines. A characteristic stop of forty minutes was made in sight of one of the "bonanza" farms of North Dakota, where various phases of North Dakota agriculture were explained from the observation end by experts of the state agricultural college, the audience being assembled about the rear of the train. The Europeans were vastly interested in many phases of western agriculture, familiar to them by reading, but now seen for the first time. They and the Americans as well wondered at the extent to which dry farming has encroached upon the range country in North Dakota, Montana, Washington and other parts of the arid west. A notable example of such successful dry farming was seen in central Washington. The party alighted at a little station called Almira, and were met by twenty-five or thirty automobiles gathered from everywhere by the industry of a railway official, the main object being to see the Grand Coulee, some twenty-five or thirty miles of dry cañon once occupied by the Columbia River. On the way to this, however, a dozen miles or more of rolling country were passed, covered with splendid wheat fields, and the harvest was in progress by means of the combined reaping and threshing machines, drawn by motors or by teams of twenty horses. These crops were growing without irrigation in a region of perhaps twelve or fourteen inches of rainfall. In the Grand Coulee the party were entertained at an outdoor lunch on the ranch of a graduate of the University of Michigan, and the party learned then, as they learned many times in the west, that the graduates of our greatest universities are likely to be found wielding hard hands and wearing a pair of overalls. The after-dinner feature of this day was a good sample of broncho "busting," by the trained cowboys of the ranch. That particular day was finished by a visit to an irrigated fruit farm, where all the ladies of the region had apparently gathered, and the foreigners got a new treat in the shape of a hundred-foot table of sliced watermelon. At Tacoma the tallest member of the party, a Chicago professor, tried in vain to measure with up-stretched arm the diameter of a log which had been pulled up out of the pond, and was put to the saw under our eyes.

A few links in the excursion were made by trips over the water. At Toledo the party was entertained on the upper floor of a skyscraper, then taken across the foot of Lake Erie and up the Detroit River by boat. The blue waters of Puget Sound and the environing slopes of virgin forests and noble cities were likewise seen from the decks of a steamer. On the Mississippi River the party spent a happy day sailing from Memphis one hundred miles down the stream, watching the sand bars, snag boats, the means taken to protect the banks, the bordering forests, and it must be said—the lone steamer or two on waters that might carry the commerce of an empire. An old-fashioned landing was made

in the twilight, head on to the shore, but it was not exactly old-fashioned to clamber up thirty feet of sand and find at the top a brilliantly lighted train of palace cars with dinner served.

There was much of a social and educational sort. Perfection of arrangement was shown almost every day, when promptly on the scheduled moment the train pulled into the station and with equal promptness a local committee stood upon the platform, and motor cars or electric cars awaiting the party stood in the street. There was the opportunity for acquaintance with the best types of American, which was by no means small, and the American members of the party in response to oft-repeated questions as to the state of the political weather, found the same muddled and unpredictable conditions with which they had become familiar east of the Mississippi River. One of the early stops was at Ithaca, where Mrs. R. S. Tarr, bravely fulfilling the desire of her lamented husband, who was to have been a member of the excursion, opened her home for a reception. Here the party met such members of the Cornell faculty as were at home during the summer, and gained some acquaintance with one of our universities, as they did also in Chicago, in Madison and other places. Many representative people were met at dinners held in Chicago, Duluth, Portland, Salt Lake City, Denver, Chattanooga and many other places. At the dinner in St. Paul the governor of Minnesota evinced his good wit by saying that he had never expected to see so many people who knew so much about the earth and owned so little of it, while Archbishop Ireland on the same occasion made a speech which, if a little long, was every word interesting and inspiring. It was not a little interesting to the French professors who sat at his side that he was quite their equal in the finished use of their native tongue. It is hardly to be believed that one hundred representative business men of any eastern town would come out by train at six o'clock in the morning a distance of fifty miles to meet a delegation of scholars, but this was done by the men of Fargo, in North Dakota, and the skidding of the automobiles in the wet gumbo outside of Fargo gave one a lasting remembrance of the quality of the black prairie soil. One of the pleasant memories of the Pacific coast is the hours of inspection and entertainment on the campus of the new University of Washington in a glorious suburb of Seattle. Indeed if any European came to the coast cities expecting to find things a little crude, he was obliged to alter his conceptions, for he saw paved streets, splendid buildings and innumerable beautiful bungalow homes, embowered in blossoms and greenery that never fail during the twelve months. The friendliest of social times was had in the Muir Woods, a splendid reservation of redwoods near the Golden Gate, on the day when Mr. John Muir, Mr. Luther Burbank and Mr. Fred G. Plummer were members of the party. At the University of Utah the entire party sat on the platform at the chapel service attended by a thousand boys and girls and brief addresses were made by one German, one Swiss and one American professor. Santa Fe brought the party into an old Indian and Spanish realm, and after a morning with prehistoric remains, the old adobe church of San Miguel was visited, and the ladies and gentlemen of Santa Fe gave a reception in the museum, an old Spanish building, once the governor's palace, now used for purposes of archeology. It was not all archeology, however, for the refreshments were good, the attire might have been seen in Chicago or Philadelphia, and the reception was preceded by Indian war dances, with all the accompaniments of hideous sounds, feathers and barbaric display to which the civilized Indian is still able to return. On the home journey there was a Conference on Geographical Education held under the presiding of President Alderman at the University of Virginia. Here five of the foreign and two of the American teachers of geography gave addresses on the teaching of the subject in European and American universities, which will be published and circulated by the University of Virginia. In Washington there

were a number of interesting entertainments consisting of dinners and receptions by the Carnegie Institution, the officers of the Congressional Library, the Cosmos Club and other institutions.

It will not be forgotten that men of the diligent type of the German and other European professors must have made volumes of various notes, and the crop of papers and books on America that may be expected in the coming years on the other side of the ocean may well be surprising. Records by photography were not the least. One of the strenuous Frenchmen took at least one thousand pictures, and it was ascertained by one of the Swiss members who had something of a genius for statistics and inquiry, that about twelve thousand photographs were made by the party as a whole.

One who had two months' experience of the excursion must almost say that the home life on the train was larger and more valuable than anything else. It surprised all to find that vehicles on wheels could become so thoroughly homelike, and it was the ordinary experience for members of the party returning even from the best of hotels to say: "We are glad to get back to the train."

The permanent American members of the party were about a dozen in number and represented Harvard, Yale and Columbia Universities, the University of Cincinnati, the State Normal College of Michigan, the Universities of Wisconsin and Chicago, Colgate University and the American Geographical Society. Many temporary members were with the party for one, two or three days at a time, in regions where they could serve as guides and helpers by reason of their own studies. A daily bulletin was issued on the train giving each day a full outline of the itinerary and work of the following day. There were endless conversations in the sleeping cars, on the observation platforms, in the observation parlors, in the dining cars, on platform steps, and everywhere. There were lectures in the train and off the train, indoors and out of doors, and as the party melted down together toward the end there were entertainments, improvised Indian dances, by a young Swiss professor, occasional mock scientific papers, taking off the foibles of the party, cartoons from the skillful hands of a number of the foreigners—in brief those bits of fun which enliven weariness and make work effective. It is a tribute to the perfection of American travel that in two months, with an average party of sixty-five persons, but one meal was served on the train, outside of the dining car.

Nothing has been said in this story of the great places. Of course they were visited—the Yellowstone (six days), Crater Lake (three days), the Wasatch and Lake Bonneville, Great Salt Lake, and the irrigated fields and orchards of the valley, the Grand Cañon (the masterpiece of nature in North America), and not least, Phœnix and Roosevelt, where the Salt River Valley, the driest and hottest region of Arizona, is being turned into one of the gardens of the continent. Best of all was the acquaintance which developed and the friendships which were cemented. An eminent foreign professor in a fraternal gathering held in one of the cars before the train broke up said that he counted the excursion the culmination of his life, and he paid tribute to the universal hospitality that they had found, both among the home members of the party and the citizens of many communities, and he said that best of all, the men of Europe had come to know the American gentleman. Not only friendship must result, but broad and just views of America by a group of foreigners supremely qualified to understand. The excursion was a kind of geographical congress on wheels, and it was a means of international comity.

The final days in New York and the closing dinner at the Waldorf Astoria made a fitting end of the two months spent together. A memorial volume will be published which will include a history of the excursion by the author of this sketch, and a considerable number of geographical essays by European members of the party.

ALBERT PERRY BRIGHAM

SCIENTIFIC NOTES AND NEWS

Dr. Paul Ehrlich, of Frankfort, and Dr. Emil Warburg, the president of the "Reichsanstalt" at Charlottenburg, have been made members of the Bavarian-Maximilian Order for art and science.

Professor J. Hadamard, professor of analytical and celestial mechanics in the Collège de France, has been elected a member of the Paris Académie des Sciences in the section of geometry, in succession to the late Professor Henri Poincaré.

Dr. Paul Marchal, of the Agricultural Institute of Paris, has been elected to membership in the Paris Academy of Sciences in the section of anatomy and zoology.

The Herbert Spencer Lecture this year will be delivered by Dr. D'Arcy Wentworth Thompson, professor of natural history, University College. Dundee, on February 13. The subject of the lecture will be "On Growth and Form."

Sir Rickman Godlee, president of the Royal College of Surgeons, will deliver the Hunterian oration in the theater of the college on February 14.

Professor James Hayden Tufts, head of the department of philosophy in the University of Chicago, has been made chairman of the Illinois Committee on Social Legislation.

The Geological Society of London will this year award its medals and funds as follows: Wollaston medal, Rev. Osmond Fisher; Murchison medal, Mr. G. Barrow; Lyell fund, Mr. S. S. Buckman; Bigsby medal, Sir Thomas Henry Holland, K.C.I.E., F.R.S.; Wollaston fund, Mr. W. W. King; Murchison fund, Mr. E. E. L. Dixon; Lyell fund, Mr. Llewellyn Treacher; Barlow-Jameson fund, Mr. J. B. Scrivenor and Mr. Bernard Smith.

Dr. Friedrich Scholt, of Heidelberg, known for his services in the cement industry, has received an honorary doctorate of engineering from the Technical Institute at Brunswick.

Major C. H. Hills is proposed by the council for election as the next president of the Royal Astronomical Society.

E. A. Wood, C.E. (Cornell, '08), has resigned as professor of civil engineering in Chang Ha College, Foochow, China, and left there on December 30. He expects to travel in North China and the Philippines and then return home *via* the Suez Canal.

The British secretary of state for war has approved of the following appointments on the army medical advisory board: as civilian physiologist, Dr. Leonard Hill, F.R.S., and as civilian sanitary expert, Dr. Henry S. Kenwood.

The annual meeting of the Chicago Academy of Sciences was held the evening of January 14 and the following officers were elected for the coming year:

President—Dr. T. C. Chamberlin.
First Vice-president—Dr. Geo. S. Isham.
Second Vice-president—Dr. Henry C. Cowles.
Secretary—Dr. Wallace W. Atwood.
For trustee to succeed himself for a term of six years—Mr. Frederick L. Wilk.
For membership in the board of scientific governors—Dr. N. S. Davis, Mr. Albert Dickinson.

Captain Roald Amundsen will speak at the University of Wisconsin on February 10.

Lieutenant Graetz, the German explorer, according to Reuter's Agency, is making preparations for an Anglo-German airship expedition across New Guinea. The airship is to be built in Germany, but to have an English name and to be manned half by Germans and half by Englishmen. The expedition will leave Europe in October and will be absent two years. Its base will be a transport stationed off the New Guinea coast. In May Lieutenant Graetz expects to be able to make a preliminary flight in the airship from Berlin to London.

At the meeting of the Sigma Xi Society of the University of Chicago, held in the Quadrangle Club on January 7, Dr. Aaron Aaronsohn, director of the Jewish agricultural experiment station at Haifa, Palestine, gave an address on the possibilities of increasing the world's wheat supply by the introduction of wild wheat from Palestine,

which is especially adapted to growth in arid regions.

MR. A. N. JOHNSON, state highway engineer of Illinois, delivered an address before the students and faculty of the College of Engineering of the University of Illinois, on January 15, entitled "The Present Status of Road Work in Illinois."

MR. DONALD F. MACDONALD, geologist of the Panama Canal, spoke to students of the department of geology of Columbia University on January 17 on "The General Geology of the Panama Canal Zone."

AT the recent meeting of the American Society of Zoologists at Cleveland, Ohio, the following resolution was presented and approved by the society:

In the death of Nettie Maria Stevens on the fourth day of May, 1912, this society loses one of its ablest members, one whose work upon the relation of the chromosomes to the transmission of sexual characters is of fundamental value. Entering upon these painstaking studies in her later years, she soon attained to a position of leadership in a peculiarly difficult field of research.

Her achievements were a credit to Bryn Mawr College, from which she obtained the well-deserved honor of the degree of doctor of philosophy, and in the world of science her place among cytologists is both secure and high.

DR. THOMAS VOLNEY MUNSON, who while engaged as a nurseryman at Dennison, Texas, made valuable experiments on the breeding of fruits, especially in viticulture, died on January 21, aged seventy years.

THE Earl of Crawford, who built an observatory at Dunecht and made contributions to astronomy, died on January 30.

THE U. S. Civil Service Commission announces several examinations for positions under the Department of Agriculture on February 24 and 26, including forest pathologist at a salary from $1,980 to $2,400; assistant forest pathologist, from $1,440 to $1,800; assistant in xylotomy, at $1,000; assistant in soil surveying, at $960 to $1,200; assistant in forest management, at $1,400; examiner of surveys, at $1,200 to $1,500, and assistant irrigation engineer at $1,200 to $1,600.

THE New York State Forestry Association was organized at a convention in Syracuse on January 16, attended by some fifty representatives of the various parts of the state. This association has for its object the fostering of genuine forestry progress in the state of New York, and in this enterprise it hopes to represent effectively the spirit of forest conservation in the state at large and of the various associations interested in the welfare of the forests of New York. During the convention valuable papers on forestry subjects were presented and the nearly fifty guests at the evening banquet were addressed by President Drinker, of Lehigh University, president of the American Forestry Association. The president of the association is Dr. Nathaniel Lord Britton, director of the New York Botanical Garden and Museums, and its secretary, Dean Hugh Potter Baker, of the New York State College of Forestry at Syracuse University.

THE State Microscopical Society of Illinois held its annual meeting on January 9, at which the following officers were elected:

President—Albert McCalla, Ph.D.
First Vice-president—Walter F. Herzberg.
Second Vice-president—Frank Harmon.
Treasurer—Frank I. Packard.
Corresponding Secretary—N. S. Amstutz.
Recording Secretary—V. A. Latham, M.D., F.R.M.S.
Trustees—M. D. Ewell, M.D., LL.D., D. L. Zook, S. S. Graves, M.D., B. U. Hills, H. F. Fuller.

The conjoint soirée with the Chicago Academy of Sciences set for February 12 has been postponed to March 12 on account of the extensive changes in the electric lighting of the academy building from the direct to the indirect system not being completed.

THE president and fellows of Harvard College voted, on January 27, to establish the Harvard University Press, for the publication of works of a high scholarly character. For some years the university publication office, besides printing the catalogues, department

pamphlets and other official documents, has found it possible, in spite of its limited resources, to issue from time to time a few special works, until it now publishes seven periodicals and more than eighty books, ranging from treatises on Indic philology to practical directions for American lumbermen. To organize and extend this activity, so as to make the university properly effective as a publishing center for scholarly books, is the object of the new foundation. The press announces several noteworthy volumes as in preparation, including books by the late Professor James Barr Ames, of the Law School, and by Professors George Foot Moore, Eugene Wambaugh, Arthur E. Kennelly, George L. Kittredge, Charles H. Haskins, George A. Reisner and W. B. Munro. The board of syndics who will decide on the books to be published are Robert Bacon, fellow of Harvard College, chairman; George Foot Moore, professor of the history of religion; Arthur E. Kennelly, professor of electrical engineering; George L. Kittredge, professor of English; Charles H. Thurber, member of the firm of Ginn and Company; Edwin F. Gay, professor of economics and dean of the graduate school of business administration, and W. B. Cannon, professor of physiology. The director of the press is Charles Chester Lane, for the last five years publication agent of the university.

It will be remembered that after the conference for the discussion of theories of radiation, held in Brussels in 1911, Mr. Ernest Solvay, of that city, established an International Physical Institute with an endowment of $200,000. An article by Professor E. Rutherford, in *Nature*, states that part of the income is to be devoted to the foundation of scholarships for the promotion of scientific research in Belgium, part to defray the expenses of international meetings to discuss scientific problems of interest, and the residue to be awarded in the form of grants to scientific investigators to assist them in their researches. For the first year, which terminates on May 1, 1913, a sum of about 17,500 francs is available for the latter purpose. It is the intention of the committee each year to give grants for special lines of work. As the first international meeting was engaged in the discussion of the theories of radiation, it is proposed this year to assist preferentially researches on the general phenomena of radiation, comprising Röntgen rays and the rays from radio-active bodies, general molecular theory, and theories of units of energy. The grants will be awarded without distinction of nationality by the administrative committee of the institute on the recommendation of an international scientific committee. The administrative committee is composed of Professors P. Heger, E. Tassel and J. E. Verschaffelt, of Brussels; the scientific committee is composed of H. A. Lorentz (Haarlem), Mme. Curie (Paris), M. Brillouin (Paris), R. B. Goldschmidt (Brussels), H. Kamerlingh-Onnes (Leyden), W. Nernst (Berlin), E. Rutherford (Manchester), E. Warburg (Berlin), and M. Knudsen, secretary (Copenhagen).

As the result of a conference which was held under the auspices of the U. S. Bureau of Mines last September, of men who are interested in the saving of the lives of miners, there has been formed a society known as the American Mine Safety Association, with headquarters at 40th and Butler Streets, Pittsburgh, Pa. This association, which is now enrolling among its members the leading coal and metal mine operators, mining engineers and mine safety engineers of the country, has for its purpose the conservation of the lives and health of the miner and a reduction in property loss due to explosions or fires in mines. It will attempt to place before the miners standard methods to be used in rescue work and in first-aid to the injured. The work of the Bureau of Mines in reducing the number of deaths in the mines has led to the adoption of many different types of rescue apparatus, such as the oxygen helmets which the rescuers wear in a gas-filled mine, and also to the use of many different methods of resuscitation and first-aid to the injured. Hundreds of mines within the last three or four years have been equipped with rescue apparatus, rescue corps and first-aid corps.

Many of these men who are called upon in emergencies have developed their own ways of doing things and it is the opinion of the organizers of this association that the most efficient methods and apparatus should be found through actual use and recommended to the mining industry as a general standard. Mr. H. M. Wilson, the engineer in charge of the experiment station of the Bureau of Mines at Pittsburgh, has been selected as chairman of the executive committee of the association and has been instructed to carry on the work of organization. Membership in the American Mine Safety Association is open to any individual, firm, corporation or society interested in the reduction of the loss of life and property in mines.

THE faculty of medicine of Harvard University offers a course of free public lectures, to be given at the Medical School on Sunday afternoons at four o'clock, as follows:

January 5—"Preventive Medicine in relation to Industrial and International Concord," Dr. Charles W. Eliot.

January 12—"The Care and Feeding of Young Children," Dr. John Lovett Morse.

January 19—"Leprosy and its Care in Massachusetts," Dr. Charles J. White.

January 26—"What the State Board of Health is doing to protect the Health of the Citizens of Massachusetts," Dr. Mark W. Richardson.

February 2—"The Sexual Instinct—its Abuse and Control" (to men only), Dr. Edward H. Nichols.

February 9—"The Responsibility of the Community for the Prevalence of Venereal Disease," Dr. Hugh Cabot.

February 16—"Dangerous Effects of Patent Medicines," Dr. David L. Edsall.

February 23—"Fresh Air, Exercise and Physical Condition," Dr. Edward H. Bradford.

March 2—"The Bladder Ailments of Men in Later Life" (to men only), Dr. Paul Thorndike.

March 9—"Ophthalmic Catastrophes," Dr. Myles Standish.

March 16—"How to cultivate Emotional Poise in an Emotional Age," Dr. George L. Walton.

March 23—"The Rise of Experimental Medicine," Dr. Howard T. Karsner.

March 30—"Tumor Diseases Peculiar to Women" (to women only), Dr. William P. Graves.

April 6—"The Management of Scarlet Fever and Measles," Dr. E. H. Place.

April 13—"The New State Psychopathic Hospital," Dr. E. E. Southard.

April 20—"The Effect of Occupation on the Hearing Power," Dr. Clarence J. Blake.

April 27—"The Hygiene of Pregnancy" (to women only), Dr. Franklin S. Newell.

May 4—"Treatment of some Emergencies of a Surgical Nature," Dr. Howard A. Lothrop.

May 11—"The Preservation of the Natural Teeth," Dr. Charles A. Brackett.

May 18—"Future Lines of Investigation of Infectious Diseases," Dr. S. B. Wolbach.

AMONG the features of the British Association meeting in Birmingham in September next, as noted in the London *Times*, will be a number of popular science lectures. In view of the central position of Birmingham a large attendance of members is expected, and a local fund of not less than £6,000 is being raised in order that the arrangements may be worthy of the city. A private canvass has already obtained the promise of nearly £4,000, and an appeal for further subscriptions will be made at an early date. Twenty-seven years have elapsed since the last visit of the association to Birmingham. The meeting this year opens on Wednesday, September 10, and continues until the 17th. On the first day, in addition to various meetings, there will be a reception of the foreign guests and in the evening the president, Sir William White, will deliver his inaugural address. The program for Thursday, September 11, includes sectional meetings, a conference of delegates, a garden party, a popular science lecture and a reception. Next day the morning is to be devoted to sectional meetings. In the evening a discourse will be addressed to members, and there is again to be a popular science lecture to the general public. Saturday will be given up to excursions which are being arranged by a special sub-committee, including the principal local archeologists, geologists and botanists. On Sunday there will be services at the Cathedral and other places of worship. Sectional meetings will again be held on the following day, and in the afternoon there is to

be a public function at the university. The local committee will entertain the distinguished visitors at night, probably at a theater. Tuesday, September 16, will be devoted to sectional meetings in the morning, and a conference of delegates and a garden party at the Edgbaston Botanical Gardens in the afternoon. In the evening there is to be another popular science lecture and a discourse to members. On the following day the meeting closes.

UNIVERSITY AND EDUCATIONAL NEWS

The regents of the University of Wisconsin have decided to ask the state legislature, now in session, for $1,000,000 to be appropriated in sums of $250,000 a year for four years, in order to provide and equip dormitories for men, a men's commons and union and a student infirmary. They have also voted to request the continuance of the present appropriation of $300,000 a year for the construction and equipping of academic buildings. For the further development of university extension work, the regents desire an increase of $25,000 a year. Owing to the reduction in the assessed valuation of personal property, resulting from the adoption of the income tax in Wisconsin, the university's fund for current expenses provided for by the three eighths of a mill tax, has this year fallen below the amount anticipated. The regents, therefore, have requested that the sum of $92,380 be appropriated to make up this year's decrease; that $175,000 be provided for next year's decrease, and $225,000 for the following year's decrease.

It appears from reports in the daily papers that Professor Willard C. Fisher, of Wesleyan University, known for his effective advocacy of legislation on behalf of the laboring classes of Connecticut, has been dismissed from his chair at Wesleyan University for stating that religion would benefit from the closing of churches for several years.

Former Dean W. A. Henry, of the College of Agriculture of the University of Wisconsin, has presented his private library to the agricultural college. It will be maintained largely for the use of the dean and director of the college and the station.

The whole staff of the college of medicine and surgery of the University of Minnesota having resigned, the regents have named the following committee to consider and make recommendations concerning the reorganization of medical teaching in the university: Dean Wesbrook, Drs. Moore, Green, Wilson (of Rochester), Tuohy (of Duluth), and Bratrud (of Warren), and the president of the university.

Mr. Alfred Knight Chittenden, forester in the U. S. Indian Service, Department of the Interior, has been appointed assistant to the director of the Engineering Experiment Station and lecturer on timber and timber resources in the College of Engineering of the University of Illinois.

Professor Edward C. Elliott, head of the education department at the University of Wisconsin, has refused the offer of the presidency of the University of Idaho recently made him by the regents of that institution.

DISCUSSION AND CORRESPONDENCE

CONN'S "BIOLOGY"

To the Editor of Science: In the last number of Science (December 28) I notice a review of Conn's "Biology," by M. M., in which the reviewer draws parallels between the subject in hand and some other sciences. It would seem that the examples selected were ill chosen to meet the point at issue. But this may be due to the fact that others look upon biology differently from the reviewer.

Biology, being the study of living things, must be concerned with either plants or animals. A book written by either of the corresponding scientists is likely to be more accurate in all details, within his field, than is a book written by a scientist engaged in the other of the two fields. To cover accurately both divisions of the subject requires a breadth of view, and a degree of detailed knowledge in each field, not often combined in a single individual; especially in these days of high specialization.

How much better will a sophomore understand the general conditions governing respiration after reading this book, in which the references in index are to animal respiration only, than from selected portions of two books showing that exchange of gases takes place both in plants and in animals?

Or what will a student understand from the statement (p. 226) that "in plants the supporting structure is, as a rule, developed better than in animals." Wherein is the oak "better" than the horse, in respect to its supporting structure?

Again what would a thinking student make of the statement (p. 234), "there are other materials made by the plants, like wood and leaves, which can not serve as food for animals," when he sees boring insects in wood, reads of beavers and their winter supply of tree trunks, and observes animals grazing on the leaves of plants?

And if any members of a domestic science class should notice the definition of yolk, page 249, as "deutoplasm (Gr. *deuteros* = second + *plasma* = substance), deposited in the egg for the nourishment of the young," when in all their cooking experience concerning eggs they are taught that the yolk is at the center, while albumen or "white of the egg" is deposited about this—what conclusions would they draw from "biology"?

No doubt a number of these misstatements are chargeable to the printers, but they should be eliminated in a second edition.

In the review signed M. M. one side of the subject is presented; in the above note, another viewpoint is taken—botany and zoology as constituting biological science.

FREDERICK H. BLODGETT
TEXAS EXPERIMENT STATION

As this work, lately reviewed in SCIENCE, will probably be used in many colleges, it may be well to point out a paragraph on distribution which certainly needs amendment:

> The high mountain ranges are perhaps the most effectual barriers of all. Practically no animal or plant is able to cross over the higher mountain ranges. The Rocky Mountains effectually separate the eastern from the western slope, and the life on the two slopes of these mountains is quite different, though the climate may be much the same (p. 381).

It would be difficult to write anything more misleading. The life on the two slopes of the Rocky Mountains is not "quite different," except when climatic (especially moisture) conditions differ on the two sides. The statement as given is nearly true for freshwater fishes in Colorado, but quite untrue for the great majority of plants and animals.

Several other things in the book should be corrected. It is certainly misleading to write "primrose," instead of evening primrose, for *Œnothera* (p. 357). I do not understand why Onychophora (p. 378) are said to be centipedes. These and other such things are of course small matters in comparison with the large amount of excellent material in the book; but there should be no flies in the biological soup prepared for college students.

T. D. A. COCKERELL
UNIVERSITY OF COLORADO

THE REFORM OF THE CALENDAR

TO THE EDITOR OF SCIENCE: With reference to my article on the reform of the calendar published in your number for May 6, 1911, Vol. XXXIII., pp. 690–2, I desire to call the attention of those who took part in the discussion at that time to further developments in the matter.

In the December number of the Esperanto *Scienca Gazeto,* published in Paris by Hachette & Co., Ch. Verax, editor, we are told that the Swiss government actually appointed the commission referred to in my article and since that time have received 30 different projects for the reform of the calendar, 14 of which were written in Esperanto and the other 16 in seven different national languages.

The commission is still open for additional proposals and it is to be hoped that all those who took part in the discussion in SCIENCE will send their proposals without delay to the address "Conseil federal" or "Schweizerischer Bundesrat" (Federal Council), Bern, Switzerland.

It is also to be hoped that all persons who approve of the proposition to reform the calendar will write to the Swiss Federal Council immediately, expressing their approval of and giving their ideas on the subject.

J. M. Clifford, Jr.

SCIENTIFIC BOOKS

Elementary Entomology. By E. Dwight Sanderson and C. F. Jackson. Ginn & Co. 1912. Pp. vii + 372.

"During recent years there has been an increasing demand for short courses in elementary entomology. For several years past the authors have been endeavoring to present such courses to their students, but have encountered the difficulty that no text-book was available which met their needs. This book is, therefore, the author's effort to furnish such a text for beginners. . . ."

In a brief introduction the authors point out the important rôle insects play in the transmission of disease, and emphasize their importance as agricultural pests. Their explanation of why insects are so numerous in individuals and in species is not clear. "The immense number of insects, both of species and of individuals, is undoubtedly due to their varied structure which enables them to live under all possible conditions. . . . Thus the insects possess such diversity of structure and habit that they are able to live under all external conditions, and on account of their immense numbers they have been able to adapt themselves to a changing environment which would have entirely obliterated classes or species few in number." In other words, insects are numerous because they are diverse in structure and are diverse in structure because they are numerous.

The book is divided into three parts: I., The Structure and Growth of Insects, 62 pages; II., The Classes of Insects, 208 pages; III., Laboratory Exercises, 84 pages.

In Part I. a brief chapter is devoted to the near relatives of insects. The figure of the spider illustrating the arachnida is from a photograph taken at such an angle that it does not show the division of the body into cephalothorax and abdomen mentioned in the text, but does show the modified antennæ (cheliceræ) which, according to the text, are not possessed by Arachnida. The treatment of the Myriapoda is inadequate even for an elementary text. No distinction is made between the Diplopods and Chilopods, and while the figure shows a Diplopod with two pairs of legs to each segment, the text says that "each segment bears a pair of legs." The same statement is repeated in the table on page 9.

The twenty-four pages devoted to the anatomy of insects show the same evidence of hasty and careless work. The original figure of a typical maxilla of the grasshopper (Fig. 11) omits the cardo. We are told that the mandibles are always essentially biting organs, though many of the copied illustrations show their piercing form. We would agree with the authors that the mandibulate mouth-parts of the different orders are "apparently homologous," but what reason is there for believing that the types of suctorial mouth-parts are "entirely dissimilar in structure and origin"? However, it is consistent with such a belief that the illustrations of the mouth-parts of the mosquito and horse-fly (18 and 20), "good examples of the piercing type," should be labeled without further discussion, according to radically different interpretations, and that Fig. 15 is referred to on page 18 as of dipterous mouth-parts, though it is correctly labeled as hemipterous.

We are told on page 24 that "the wings are strengthened by numerous thickenings called *veins*, whose number and position form the basis of the classification of families, genera and species." Then, important as the subject would seem to be, a half paragraph, accompanied by an incorrectly labeled figure of the wing of a house fly, is devoted to a summary of the Comstock-Needham system, while in the systematic portion thirteen dipterous wings labeled according to this same system are illustrated and the key to families uses another system which is not even mentioned —not to say *explained*—in the text.

In the chapter on growth and transformations of insects the authors fail to make very clear the real distinction between complete and incomplete metamorphosis. "The transformation of the butterfly from the caterpillar is a *complete* one, and is known as a complete metamorphosis. The growth of the grasshopper, on the other hand, is gradual and presents no striking changes, and is known as *incomplete metamorphosis.*" In view of this definition the elementary student will be at a loss to understand why later in the book the Aptera are said to have no metamorphosis. As illustrations of the types of metamorphosis an account is given of the life history of the squash-bug, differential locust, tent caterpillar and spiny elm caterpillar. The account of the squash-bug is apparently from first-hand observation, the others are poorly digested from Morgan and Weed. A confusing error occurs in the account of the differential locust; Fig. 66 shows five grasshopper nymphs of various sizes and the legend says "First three stages of the nymphs of the differential locust"; Fig. 68 shows the last two. The text says that the different stages will be found in Fig. 67, which is a picture of an egg mass.

Part II., The Classes of Insects, opens with a chapter on classification which the authors could improve greatly by adopting a more direct and concise style.

The orders are then taken up in the usual sequence and treated very briefly. There is a superabundance of good figures, mostly borrowed, and the text often takes the form of a running comment on the pictures in the style of a stereopticon lecture, rather than a connected account to which the illustrations are subordinate. Of the 496 figures in the book, 406 or over 80 per cent. are borrowed from other works or are from borrowed photographs. Is there not danger that the elementary student might get the idea from these borrowed pictures that entomology is a second-hand science? Most of the figures are good, but some could be greatly improved. Some of the cuts of butterflies attributed to Fiske are very poor; the specimens seem to have been slightly out of focus and the negatives thin and flat. The bronze copper butterfly is certainly not so rare that there is any excuse for using a photograph of a mutilated specimen. Fig. 116, labeled "A Myrmeleonid, the adult of the ant-lion," is a Chrysopid.

This portion of the work contains many misstatements, only a few of which can be noted here. The long rows of tree-cricket eggs in raspberry canes are still credited to *Œcanthus niveus* in spite of the recent work of Parrott (Fig. 110). In speaking of the armored scales, the surprising statement is made that "with the first molts the female loses her legs and eyes, and the body becomes a mere mass of yellowish protoplasm with long thread-like mouth-parts," etc. The American rose-slug is given one generic name in the figure (Fig. 385) and a different one in the text; a similar slip occurs in the case of the screw-worm fly (Fig. 376). On page 243 it is stated that most of the larvæ of the Hymenoptera live within the food, exception being made of the first two families (Tenthredinidæ and Siricidæ). This is an inaccurate statement in the case of the larvæ of most of the aculeates as well as many parasitica. The remarks upon the ovipositor of Siricidæ apply only to that family in the strict sense, and not at all to the other families, which we are forced from the keys to assume are included under the term Siricidæ. The only definition of the stigma that is found appears in the statement under Cynipidæ that they lack "the dark spot or stigma toward the end of the anterior margin of the wings." The largest Braconidæ are stated to be not over one eighth of an inch in length, and the largest Proctotrypidæ not over one twenty-fifth of an inch; an astonishing statement in view of the fact that the typical genera *Bracon* and *Proctotrypes* both contain species measuring 10 mm., not to mention still larger common forms in other genera.

In Part III., Laboratory Exercises, six chapters are devoted to the external and internal anatomy of insects, the comparison of different types of arthropoda and of insects, the study of mouth-parts, etc. These exercises

are carefully arranged, are well written and apparently have been tried out with elementary classes. These chapters form the most satisfactory part of the work.

In chapter XXII., Classification of Insects, keys are given by which the student is supposed to be able to determine insects to orders and families. Here the authors have not been so fortunate.

The classification of the Hymenoptera adopted (p. 319) is woefully inadequate even for a very elementary text, and does not represent any of the progress made within the last quarter of a century. Granting the diversity of opinion that still prevails in regard to many points of the classification of this order, there is, however, much that has been done within that time that can not properly be ignored.

The inclusion of saw-flies, gall-flies and parasitic Hymenoptera in one suborder, as contrasted with all the remaining groups (aculeates) in another, is indefensible. The inclusion of Lydidæ and Xyelidæ in the Tenthredinidæ, and of Cephidæ, Xiphydriidæ and Oryssidæ in with Siricidæ has no longer any justification. On the other hand, the best founded work on ants to-day recognizes but a single family, comprised of five subfamilies. It would seem that this position might at least be advantageously maintained in an elementary key which, for the sake of brevity, omits mention of many important families. Neither this course was followed nor the alternative of including five family groups. On the contrary, three family names appear in the key, Poneridæ, Myrmicidæ and Camponotidæ. The Dorylidæ, relatively unimportant in this country, as well as the very important Dolichoderidæ, are not mentioned. The latter includes the economically important Argentine ant (referred to in the text on page 259 as belonging to the Myrmicidæ) as well as several very common North American forms which the casual student is far more likely to frequently meet with than he is with any Poneridæ. By the key all the Dolichoderidæ would fall into the so-called Camponotidæ, with which they have no closer relation than have any of the other groups of ants. The term *Camponotidæ* for the group containing the genus *Formica* is used for Formicidæ, despite the fact that the superfamily name Formicina based on that genus is used directly above it—a rather astonishing neglect of the established customs as well as codes of nomenclature.

There may be some excuse for omitting from the key such families as Evaniidæ, Stephanidæ, Trigonalidæ, Sapygidæ and Mellinidæ, but to be consistent the equally uncommon Masaridæ should be omitted. But why is there no place provided for the Larridæ, Nyssonidæ, Philanthidæ, Pemphredonidæ and Crabronidæ, all of which are abundant in species and individuals? The majority of the species belonging to these families fall, according to the key, in the Bembecidæ, the others in Sphecidæ, but the division is along a line that can make no pretense of being natural or even convenient.

It might also be noted that there is no provision made for wingless Hymenoptera in the keys and that therefore the wingless parasitic species, the worker ants and female Mutillidæ can not be classified. The term Psammocharidæ is used for Pompilidæ or Ceropalidæ of older authors, but the name Proctotrypidæ is not replaced by Serphidæ.

The whole principle of key construction with the intention of omitting "less important" forms is open to grave objection. The result is that the student chancing upon a specimen of a non-included group (and in the present case such specimens will be legion) ends in running it out to a family to which it does not belong, and confident in the correctness of his labors and unsuspecting the untrustworthiness of the key, has it impressed upon his memory as one of the types of that family. A far better method, in fact the only defensible method where keys are presented, is to make them complete enough to provide correctly for *all* forms coming within their scope, and then if deemed desirable rare or less important groups may be bracketed or set in special type. Otherwise it were better the tables were omitted altogether.

The key to the families of Diptera is written by an eminent authority in that group and will doubtless prove one of the most valuable parts of the book. Unfortunately some of the smaller families are omitted. The most serious drawback, so far as the present work is concerned, is the fact that the old and complicated Schinerian system of wing venation nomenclature is used, but nowhere explained, the explanatory figures of wings of Diptera, as in the other orders, being lettered by the Comstock-Needham system. The wing of *Blepharocera* is figured, although the Blepharoceridæ are omitted from the keys and the text does not explain that the intricate maze of intersecting lines are not veins, but folds in the wing membrane. They will surely puzzle any one who does not appreciate that fact. "Second boscal" cell (bottom of p. 323) is probably a misprint.

The wings of Hemerobiidæ are not ordinarily opaque, as stated in the table on page 307. Only one family of Trichoptera is recognized, although all authorities to-day would agree in recognizing more. Only one family of Thysanoptera is recognized, despite the fact that modern authorities recognize two suborders and several families.

In the key to families of Hemiptera the first category is "wingless insects with fleshy unjointed beak," its alternative is "winged or wingless insects, with a jointed beak," but under the latter is a subheading which provides for wingless insects with the beak wanting! Further, the beginner would often experience difficulty in recognizing the jointed character of many Coccid beaks.

The Aphidæ are differentiated from Aleyrodidæ and Coccidæ by having "long and slender legs and transparent wings," while the two latter are said to have "legs short, wings usually opaque." It is hardly necessary to mention the many legless Coccidæ, as well as the long-legged forms (*Orthezia,* etc.).

In the table to Coleoptera the majority of families are omitted altogether, and so are very many in the Lepidoptera. In the discussion of the latter order no mention is made of a division into two suborders Jugatæ and Frenatæ, but the *butterflies* and *moths* are said to form two main divisions of the order. The wing of *Hepialus,* however, is figured and the jugum noted in the legend. Such an insufficient statement as "subcosta and radius of hind wing connected by a cross-bar" is noted in the characterization of Sphingidæ.

The work closes with chapters on collecting and preserving insects, which will be of great value to the student.

The book is well printed on good paper and the illustrations, as a rule, come out well; when properly revised, it will make a welcome addition to the rapidly growing list of entomological texts, from which the teacher can choose the one best suited to the needs of his students.

C. R. CROSBY

CORNELL UNIVERSITY

Dynamic Meteorology and Hydrography. Part I., Statics. By V. BJERKNES and J. W. SANDSTRÖM. Quarto. Pp. 234. Part II., Kinematics. By V. BJERKNES, TH. HESSELBERG and O. DEVIK. Quarto. Pp. 175 (with atlas of 60 charts). Carnegie Institution, 1911.

The object of this treatise is to develop practical methods for the systematic study of the pressure, temperature, humidity, density and velocity of the atmosphere. On account of the difficulty of solving the differential equations of a viscous gas the methods are almost entirely graphical, elaborate tables being given that obviate the necessity of even ordinary integration. In Part I. it is assumed that the conditions of equilibrium are fulfilled along every vertical line. From the records of a balloon sent up with self-registering instruments for pressure, temperature and humidity, it is therefore possible to calculate the pressure and density at different heights. For facility of calculation the authors divide the atmosphere into sheets each about 1,000 meters thick, beginning at sea level, and find the average density and temperature of each sheet. To allow for the humidity and still use Boyle's law, as for dry air, a virtual temperature is used that is derived from the

humidity and the actual temperature. In some cases the authors prefer to use, instead of the sheets, the heights of the surfaces of equal pressure drawn at intervals of one tenth of an atmosphere. Less accurate results can also be found from observations at the earth's surface, assuming average values for the changes as one ascends vertically. By these two methods it is possible to draw level surfaces and vertical sections that show the pressure and density at different parts of the atmosphere. If the equilibrium were exact the surfaces of equal pressure, of equal density and the level surfaces would coincide. The more these surfaces differ from each other the greater the tendency to motion. Similar considerations are discussed for the oceans, but these do not at present appear to have the same importance as the atmosphere. The second part takes up the representation of velocity. From observations of small balloons the horizontal velocity in different localities and at different heights can be found. These results are averaged with respect to height for the sheets of the atmosphere that were used in the first part of the work. The lines of flow can now be drawn for each sheet and also the curves of equal velocity. In some cases the authors use "isogonal" curves, namely, curves of equal direction of velocity. The use of these curves to solve differential equations is credited to Sandström. It appears, however,[1] to be due to Massau, who called them "isoclines." Towards the end of the volume these diagrams are used to deduce the vertical motion of the atmosphere under the assumption that momentum is a solenoidal vector, a downward velocity indicating precipitation. A supplement of 60 excellent maps comprises conical projections of the earth's surface showing the contour lines, in 24 sheets, and examples of the preceding methods applied to actual cases. The middle of Part II. contains an elegant study of two dimensional vector fields and of the graphical treatment of the operations which occurs in the differential equations of hydrodynamics.

[1] See D'Ocagne, "Calcul Graphique."

It is to be hoped that the authors will complete their work by a third part, on the dynamics of the atmosphere, as distinct from the kinematics, including Professor Bjerknes's own work on this part of the subject, and also extend the period of six hours, which is the limit of their prognostications, at present. A fuller treatment of the thermodynamics of the atmosphere would also be desirable.

F. R. Sharpe

The Theory of Experimental Electricity. By W. C. D. Whetham, F.R.S. Second edition. Cambridge, The University Press; New York, G. P. Putnam's Sons. Pp. xi + 340. $2.50 net.

It gives us great pleasure to welcome a new edition of Mr. Whetham's text-book. This work presents the subject of electricity as a living science and is characterized by a wonderful freshness of treatment. It is thoroughly up to date and includes such matters as the thermodynamic theory of electrolytic cells, conduction through gases, radioactivity and the electron theory. Although of necessity brief, the treatment of these subjects is quite accurate. Excellent judgment has been shown in the choice of material and the newer branches of the science are exhibited in their proper relationship to the old. One of the striking features of the book is the combination of simplicity and accuracy in the proofs used in establishing the important principles of the science.

We regret to observe that two blemishes which we noticed in the first edition have not been removed. The treatment on pp. 35 et seq. of the force due to a charged plane as though the charge resided on both sides of the plane is cumbersome if not actually misleading. The proof on page 105, of the mechanical force on a current due to a magnetic field, is fallacious as it stands; although it is made to give the right result. This matter could easily be rectified without changing the method. We also think that it is high time that Franklin's proof that the charge resides in the dielectric were dropped from the text-

books. The inference from the experiment is fallacious; moreover the experiment does not work if the dielectric is dry and low potentials are employed, or, in any event, if the dielectric is a gas or a vacuum.

Despite these minor blemishes the book is an excellent one. The style is admirable and the whole treatment is calculated to inspire the interest of the student. We can thoroughly recommend its use with classes which have already had a general course in physics.

O. W. RICHARDSON

PRINCETON UNIVERSITY

SPECIAL ARTICLES

RELATIONSHIP OF THE INDIAN LANGUAGES OF CALIFORNIA

ANTHROPOLOGICALLY California has always been noted for its linguistic diversity, which has been accepted as being greater than that of any other part of the world. Since Powell's standardizing classification, which allotted 22 distinct families of native languages to the state, only one consolidation, that of Shasta and Achomawi, has been positively asserted and generally accepted. Two or three other pairs of languages have for some time seemed to be probably each reducible to a common origin; but the specific similarities determined were weakened by the frequent occurrence of both lexical and grammatical resemblances between many other families which there was no justification for connecting genetically. These grammatical resemblances have been several times discussed by us and attributed to the inter-influence of distinct families, due to geographical contact. The lexical similarities we have assumed, in all but a few cases, to be the result of borrowing. It became clear that until the degree and extent of this mutual influencing and borrowing among unrelated languages were more precisely ascertained, the relationships suspected in the few instances referred to were capable of explanation through such borrowing on a slightly more intensive scale, and would therefore never advance beyond the stage of probability. For this reason we undertook some time ago a comparison of more than 200 stem words in all the languages and dialects of California so far as material was available. From the time the material began to be assembled, some interesting results as to the character and scope of the borrowing of words commenced to appear; but after analysis of the collected information had progressed beyond a certain point, it became apparent that the only satisfactory explanation of the resemblances between certain languages was genetic relationship. On the basis of these indications the grammatical information extant on the same languages was reexamined, and in every instance was found strongly confirmatory. Lexical and structural similarities coinciding and being relatively abundant, true relationships have been accepted as established. The new larger families and their components are:

Penutian, comprising the groups formerly known as Maidu, Wintun, Miwok, Costanoan and Yokuts. This is a relatively large and compact family, occupying practically the whole of the drainage area of the great valley of California.

Hokan, comprising certainly Shasta, Chimariko and Pomo, probably Karok, and possibly Yana. The territory of this family is in the hill country to the north and west of the Penutian, and is more irregular.

Ritwan, comprising Yurok and Wiyot. No new proof on the previously suggested possible relationship of these two languages was obtained, except the negative evidence of complete lack of resemblances of both to any other family, which of course increases the weight of the similarities between the two, insufficient though these may yet be for absolute demonstration.

The number of distinct families in California is thus reduced from 21 certainly to 15 and possibly to 12.

Owing to the absence of one of the undersigned in Asia at the present moment, some time must elapse before our material and conclusions can be finally revised and published. For this reason the present announcement is issued.

R. B. DIXON,
A. L. KROEBER

CRITICAL CRITERIA ON BASIN-RANGE STRUCTURE

As commonly regarded, basin-range mountains constitute an orogenic type by themselves; novel, isostatic, youthful appearing. The hypothesis of their structure is one of the most brilliant concepts in the history of American geology; at the same time it is one of the most fanciful, as the severe testing of a generation amply proves. Singularly enough, the theory had its birth in a district where even its fundamental form seems to be entirely without representation.

At this day and distance the extension of the hypothesis to all the so-called fault-block mountains of the arid regions appears to be not only too broad a generalization, but quite unfortunate. Although I should not wish to be the first to make so sweeping an assertion as lately was done by Dr. Spurr, that no one has ever seen the fault-lines blocking out the desert ranges, his statement is almost literally true, as all recent critical evidence on the subject fully attests.

The attractive feature of Gilbert's theory of basin-range structure was of course the strong support it was thought to give to the now famous hypothesis of isostasy. Concerning some of the fundamental premises, I long ago entertained serious doubts. It has since been fully shown that there was decided error in determining the degree of completeness of the compensation that invalidated the conclusions.

With the challenge of the basin-range hypothesis there has come a demand for citations of concrete examples in support of the theory. Thus far, after the elapse of a full decade and after frequent repetition of the demand, the evidence has not been forthcoming. The Cricket Range, in Utah, recently described in this journal as furnishing a key to the problem, emphasizes this shortcoming. It is not the mere display of profound faulting that is the main desideratum. Abundant evidence of this kind is readily found in nearly every one of the desert ranges. In the majority of cases such faultings are found to have no relations to the present orogeny. Where, according to the hypothesis, the bordering faults should be they are not; but when found they are usually miles out on the intermont plains. The present sharp meeting of mountain and plain is now explained by causes other than dislocation, through ordinary stream-corrasion according to Paige, or through sheet-flood erosion as urged by McGee. Under a title of "Locus of Maximum Lateral Deflation in Desert Ranges" I have called attention to its eolative origin.

By displacement are explained the steep truncations of the transverse ridges of many desert ranges. That these bevelments are really fault-planes bounding the mountain-blocks will have to be more strongly supported than it is now, by direct and unquestionable evidence, before the assertion can be accepted. These rows of truncated ridges seem rather to mark the lines of battle between the plano-rasive advance of eolic degradation from the desert side and the normal stream-corrasion of the more moist mountain areas.

In the light of the recent advances in our knowledge of the prodigious amount of deflation which takes place under climatic conditions of aridity it appears that the generally accepted hypothesis of basin-range structure will have to be abandoned and the origin of the desert mountains ascribed to eolic erosion mainly, rather than to local tectonic displacement.

Charles R. Keyes

NOTE REGARDING THE RELATION OF AGE TO FECUNDITY[1]

In his valuable book on "The Physiology of Reproduction" Marshall,[2] in a section on the relation of age to fecundity, says (p. 590):

> The fecundity of the average individual woman may be described, therefore, as forming a wave, which, starting from sterility, rises somewhat rapidly to its highest point, and then gradually falls again to sterility. There can be no doubt that animals as a general rule tend to follow a similar law.

[1] Papers from the Biological Laboratory of the Maine Agricultural Experiment Station, No. 43.

[2] Marshall, F. H. A., "The Physiology of Reproduction," London (Longmans, Green & Co.), 1910, pp. xvii + 706.

A record of the entire breeding history of a rather remarkable ewe, of which I made a note some time ago for another purpose, illustrates this law in so clear a manner that it seems desirable to publish it with some discussion, particularly since the place of original appearance of the record is neither readily accessible nor likely to come to the attention of the biologist.

The record referred to was contributed to the *New England Farmer*[3] by Mr. Chas. Mattoon, of Lenox, Mass. The ewe in question was owned by one of his neighbors, Colonel Nathan Barrett, who, at the request of Mattoon, drew up the following account:

I hereby certify that I have owned a native ewe sheep, for the space of nineteen years, lacking a few days; having retained her usual vigor for seventeen years. But in the fall of 1822, I observed for the first time, and with no small degree of interest, that she slackened her pace, and went in the rear instead of front, which she continued to do for one year. After which, having nearly lost use of her eyes, and teeth, I took her under my immediate care for the last six months, until March, 1824, when she died with old age—having given me nineteen fleeces of wool, and borne me thirty-six full-grown lambs, viz.:

	Lambs		Lambs
April , 1806	1	1815	2
1807	1	1816	2
1808	2	1817	2
Apr. 3, 1809	3	1818	2
Mar. 29, 1810	3	1819	2
Making 6 lambs in 11 months and 26 days.		1820	2
		1821	1
1811	3	1822	1
1812	3	1823	0
1813	3	1824	0
1814	3	Total	36

The general accord of this case with the law discussed by Marshall is obvious. Beginning with the minimum degree of fecundity possible (excluding absolute sterility) there is a rather rapid increase to a maximum, which is maintained for a time. This is followed by a decline in fecundity more gradual than the rise, ending finally in absolute sterility.

[3] Vol. III., June 3, 1825, p. 353.

The case is of especial interest in the present connection because of the fact that it is a *completed* record, carried to the natural end of life of the individual. Such completed breeding records are rare for higher animals.

It is of interest to make certain biometric computations from these data. If the age of the ewe is taken as abscissa and the number of lambs born as ordinate one can calculate by the ordinary methods the arithmetic mean point of this animal's total fecundity period, and certain other constants of interest. The only difficulty in making such calculations arises from the fact that no precise statement is made as to the age of the ewe at the time when the published lambing record begins. It is altogether reasonable to assume, however, that (*a*) the first lamb recorded is the first one borne by this ewe, and (*b*) that she was about one year old when this lamb was born. These assumptions will be made in the calculating, and further it will be assumed that the abscissal classes throughout center at even years of life.

Making these assumptions I find:

(*a*) That the arithmetic mean point of this ewe's effective breeding life was at 8.57 years.

(*b*) That the median point in her breeding career was at 8.17 years. That is, she produced one half of her offspring before that age and one half after it.

(*c*) That the modal breeding point[4] (*i. e.*, the point of maximum fecundity per unit of time) was at 7.34 years.

Taking into account the 17 years in which some young were born I find the following constants regarding the number of lambs per birth:

Mean number of lambs per birth	2.12 lambs.
Standard deviation in number of lambs per birth	.76 lambs.
Coefficient of variation in number of lambs per birth	35.78 per cent.

These are intra-individual constants based on an unusually long and completed breeding

[4] Calculated by the approximate relation that the distance from mean to mode is three times the distance from mean to median.

history. For comparison the following intraracial (inter-individual) coefficients of variation for fecundity in other forms are tabled:

Constants of Variation in Fertility and Fecundity in Various Animals

Organism	Character	Coefficient of Variation	Authority
Poland-China swine.	Size of litter	27.411	Surface[5]
Duroc-Jersey swine.	Size of litter	25.997	Surface[5]
Mouse	Size of litter	37.5	Weldon[6]
Horse	Fecundity[7]	24.771	Pearson[8]
Man	Number of children	48.41	Powys[9]
Domestic fowl	Annual egg production	34.21	Pearl and Surface[10]

It is plain that the individual variability in "size of litter" shown by this ewe is of the same general order of magnitude as that found in other organisms for fecundity characters.

RAYMOND PEARL

THE INDUCTION OF NONASTRINGENCY IN PERSIMMONS AT SUPRANORMAL PRESSURES OF CARBON DIOXIDE

IN a previous issue of this periodical,[1] I reported the results of some experiments to determine the relation of different pressures of carbon dioxide to the rate at which persimmons are rendered non-astringent by means of that gas. Two varieties were used in those experiments, *Taber 129* and *Hyakume,* as these are understood at the Alabama Experiment Station. I had already found that under normal pressure of pure and of approximately pure carbon dioxide[2] these varieties occupied from six to eight days in losing astringency, the *Hyakume* being the slower to respond to treatment. Under a pressure of 15 pounds of pure carbon dioxide, the period was found to be reduced to less than 46 hours. To be more explicit, 24 hours was found to be insufficient for either variety, while at the end of 46 hours all astringency had totally disappeared. The minimum period required at this pressure was not determined at the time for lack of material. It was, however, quite evident that the time necessary to render these varieties non-astringent at normal pressure of carbon dioxide can be reduced to less than one fourth at 15 pounds. It then remained until the season just closed to determine these relations more accurately and with reference also to still higher pressures. It is upon this work that I desire to submit at this time a preliminary report.

Meanwhile the results of experiments made by Dr. H. C. Gore[3] on the effect of carbon dioxide at normal pressure have appeared. The varieties which he studied include *Taber 23* and *Hyakume,* so that his results are distinctly pertinent in the present connection. Gore used a metal receiver especially designed by him to meet practical requirements, and, as indicated by his controls, is doubtless as efficient for exact experimentation as a glass receiver. The experiments with *Hyakume* were done at Macclenny, Fla., so that the fruits of this variety were not subject to the exigencies of transportation. As to these conditions, therefore, Gore's experiments may be regarded as directly comparable to my own, which also were done on the ground in metal glass and wooden receivers. Gore's *Taber 23* fruits were processed in Washington. As to the numbers of fruits used in Gore's experiments, only three of *Hyakume* were available,

[5] *Biometrika,* Vol. VI., pp. 433–436, 1909.

[6] *Biometrika,* Vol. V., pp. 442, 1907.

[7] Fecundity in this case means the fraction which the actual number of offspring arising from a given number of coverings is of the possible number of offspring under the circumstances.

[8] *Biometrika,* Vol. I., pp. 289–292, 1902. Actually only the moments of this fecundity curve are given at the place cited. From the moments we have calculated the coefficient of variation.

[9] *Biometrika,* Vol. V., p. 251, 1905.

[10] U. S. Dept. Agr., Bur. Anim. Ind., Bull. 110, Part I., pp. 1–80, 1909.

[1] Lloyd, F. E., "Carbon Dioxide at High Pressure and the Artificial Ripening of Persimmons," SCIENCE, N. S., 34: 924–928, December 29, 1911.

[2] The protocols of these and the remaining experiments will be published elsewhere in full.

[3] Gore, H. C., "Large Scale Experiments on the Processing of Japanese Persimmons, with notes on The Preparation of Dried Persimmons," U. S. Dept. of Agri., Bur. Chem., Bull. 155, May 10, 1912.

while of *Taber 23,* 68 fruits were processed, 71 serving for control. The three *Hyakume* were treated *in vitro;* the *Taber 23* in the metal receiver.

With conditions thus similar to those of my own experiments, Gore found that under normal pressure of carbon dioxide the *Taber 23* became nonastringent in two days and the *Hyakume* in 36 hours.[3] Previously[4] these had been found to yield to treatment in three days' exposure to vapor of alcohol of 5 per cent. and 25 per cent. strength in wooden tubs, the alcohol replacing, in this experiment, the *saké* of the empirical method of the Japanese. This result of Gore's I had overlooked at the time of my previous communication, or otherwise I should have been compelled to point out a discrepancy as between Gore's data and my own obtained with alcohol vapor for which I could not at that time have suggested an explanation. The discrepancy lies in the period required to render the fruit nonastringent with either carbon dioxide or alcohol vapor. Setting aside the *Taber 23* used by Gore as different from the *Taber 129* used by me, and therefore not comparable, the *Hyakume* in Gore's experiments yielded, under similar conditions, in less than one fourth the time required in mine; and, with reference to carbon dioxide alone, Gore succeeded in processing this variety under normal pressure in 36 hours, just the time, as it eventuated this year, required for apparently the same variety under 15 pounds. I do not argue from this that any doubt is thrown on Gore's work, nor would it be just to maintain the converse. It seems entirely probable rather that he and I have been working on different kinds. I have lately found that Japanese nurserymen on this continent recognize two subvarieties (using this term as a convenience) of *Hyakume,* the fruit of one of which becomes nonastringent while still firm and on the tree, while that of the other does so only after softening. It can scarcely be doubted that the former would appear to yield to the carbon dioxide treatment more readily than the latter. Furthermore, these physiological differences may not be confined to different races of the persimmon only, but may be highly individual, and different even in the same individual from year to year. In support of this I have to cite an important observation on the fruit of *Taber 129* growing at Auburn, Ala., on the station grounds. There are two trees, from which was obtained all the fruit for my experiments in 1911 and 1912. In 1911 the fruits from both the trees were, unless processed, uniformly highly astringent until softening was advanced. To render them nonastringent while still firm and crisp occupied 6 days in carbon dioxide alone at normal pressure. The fruit was tested each day, and there can be no doubt of the substantial correctness of the statement. In 1912, much to the surprise of both myself and my former colleague, Dr. F. A. Wolf, who aided me in carrying out the experiments to be presently mentioned, the *Taber* fruit apparently yielded to carbon dioxide at whatever pressure used, however low, and no matter how brief the treatment. But it was soon discovered that the real fact of the case was that *all the fruit was already nonastringent on the tree,* and this was true equally of fruits which were quite green and of those which were more or less of the definitive color, from yellow to deep orange. There were, moreover, in these fruits a very large number of reddened tannin masses, so that the inner portion of the mesocarp looked quite brown. That, however, this reddening of the tannin, due to oxidation, was not the cause of nonastringency is shown by the fact that the pulp was equally nonastringent where the oxidization had not occurred at all. I had previously ventured the opinion that the apparent absence of tannin from the nonastringent varieties might be due to the oxidized condition of the tannin, since I had been informed by Mr. Geo. C. Roeding, of Fresno, Cal., that the flesh of such kinds is freely interspersed with reddened cells. It now appears more probable that the reddening of the tannin masses is consequent on the nonastringency, and is not the cause of

[3] Gore, H. C., "Experiments on the Processing of Persimmons to render them Nonastringent," U. S. Dept. Agri., Bur. Chem., Bull. 141, September 29, 1911.

it; is indeed rather a result of the death of the tannin idioblasts,[5] and can be seen to proceed *in vitro* equally well, either spontaneously, but rather slowly, or rapidly under the effect of certain acids. It seems true, therefore, that the cause of nonastringency in all the varieties, whether they are the so-called nonastringent kinds or not, is the same. I have advanced an explanation of the phenomenon elsewhere[6] and the present issue does not call for a restatement.

In view of the possibilities in the case, therefore, I am bound to retain faith in the significance of the experiments upon which I based the conclusion that the higher the pressure of carbon dioxide, the shorter the period required to render the fruit nonastringent, especially as repetition and extension, in 1912, of the experiments of 1911 have discovered no discordant evidence.

The experiments were done during the first two weeks of September, 1912, at Auburn, Ala. The receivers used were four in number, all alike in construction. Each consisted of a piece of four-inch gas pipe two feet long, capped at both ends. A pressure gauge was inserted laterally, while each cap carried a gas cock, thus allowing the entrance and exit of the gas and air. This apparatus was cheap and efficient, but was not altogether easy to manage. It was necessary to work in a machine shop where pipe vises and large wrenches were at hand to screw home the large cap which had to be removed in order to examine the fruit. Graphite "dope" was used to make the joints tight. Though a pressure of 90 lbs. was in one case maintained for 24 hours, it usually fell a little, due to insufficient skill in getting every joint tight. The fall was, however, slight in any case, and, in view of the relations found, can be regarded as affecting the result but negligibly.

The fruits used were *Hyakume,* as stated, and *Tane-nashi.* For a supply of the latter I am indebted to Mr. C. L. Coleman, Fairhope, Ala., who was kind enough to send a large basket of choice material. For the name of this variety, I rely upon general acceptance in Alabama. The fruit answers also to the current horticultural descriptions. The *Taber 129,* which had been used in the experiments of 1911, were excluded for the reasons above stated.

The condition of the fruit as regards maturity was various, ranging from complete greenness to partly orange, the intermediate shades of yellow, yellow-green and yellow-orange being represented—this in *Hyakume.* The *Tane-nashi* ranged from pale yellow to orange. It was found that the rate of becoming nonastringent was *as rapid in the green as in the more mature fruits so long as they were under the influence of the carbon dioxide.* If, however, they were insufficiently processed, and then kept exposed to the air, the subsequent changes were more rapid in the more mature fruits. Maturity then did not modify the immediate effect, and the range of condition in regard of maturity rules out error due to difference of ripeness. The fact is one, moreover, of prime theoretical importance.

In charging the receivers, a corresponding number of sets of fruits was chosen in such manner that each set contained the same range of color. The charge consisted of 8 fruits in each instance. Each fruit was selected carefully for its soundness, and no bruised or otherwise injured fruit was used, except in the case of the *Tane-nashi,* which, on account of transportation, was in some instances more or less bruised. This was, however, found to have no immediate effect on the rate of processing, though the keeping of the fruit thereafter was affected, as was true also of the other kinds.

In the several experiments[7] pressures ranging from normal to 90 lbs., were employed, together with controls in air. By charging

[5] Lloyd, F. E., "The Behavior of Tannin in Persimmons with some Notes on Ripening," *Plant World,* 14: 1–14, January 1, 1911.

[6] Lloyd, *l. c.,* note 5.

[7] While the results obtained with *Tane-nashi* are in general accord with those from *Hyakume,* they are not by any means as clear-cut and unequivocal. I shall therefore withhold them from the present discussion, but will embody them in a later account.

the receivers at different pressures and opening them at stated intervals, the period required for processing could be determined with all necessary accuracy, certainly within a very few hours. Both time and circumstance prevented a high amplitude of experimentation, so that pressures between 15, 25, 45, 75 and 90 lbs. were not tried. Concerning the highest of these (90 lbs.) it may be stated summarily that the fruit was killed, and on being taken out, at the expiration of 24 hours, was discolored (brown) and watery. It was, however, nonastringent. Whether the cause of death was due to rupture of the cells consequent on the too rapid increase or decrease of pressure, or on asphyxiation accompanied by change in permeability of the protoplast, I can not say. If the fruit was too soft, and the pressure released too rapidly, even when the initial pressure was no higher than 15 lbs., the fruit was burst, and microscopic examination showed that many individual cells were also in the same case.

The experiments were, moreover, designed to determine (1) the minimum period of time required to cause nonastringency at the pressures used; and (2) the after-effect of dosage at given pressures applied for periods insufficient in themselves to produce nonastringency. Aside from the theoretical interest attaching to the latter question, the possible economic application of short dosage, if followed by nonastringency within definite periods, was contemplated. The minimum period required to effect nonastringency was determined critically for normal, 15 and 45 lbs. pressure, the volumes of CO_2 being 1, 2 and 4, respectively. The after-effect of dosage at 45 and 75 lbs. was determined with sufficient accuracy to indicate definite quantitative relations.

It was found, in the first place, that at the end of 36 hours with 15 lbs. pressure (experiment 12 *a—d,* 1912) the fruits were nearly nonastringent. Further treatment for three hours produced complete astringency. It is probable that the period required is nearer 36 than 39 hours, but not less than the former nor more than the latter. At 45 lbs. 12 hours was found insufficient (experiment 11 *d,* 1912), while at the close of 15 hours there was a scarcely perceptible astringency (experiment 9, 1912). It may be recalled that the variety in question (*Hyakume,* an "astringent variety") had been found in 1911 to require 6–7 days at normal pressure, and less than 46 hours at 15 lbs. Controls in air this year remained hard and astringent during the whole period of experimentation, nearly three weeks. It therefore emerges that, as I have previously maintained, there is a quantitative relation between the amount of CO_2 available and the rate at which the astringency disappears. Green fruits yielded as readily to both pressures as yellow or pale orange, which appears to indicate that, during the natural course of events, after the fruit has its full growth at any rate, the tannin cells are ready for the change leading to nonastringency, and that this change is induced by some condition set up in the tissue external to the tannin cells themselves. The graph determined by the data above indicated is that of a rectangular hyperbola, and this may be held tentatively as expressing the relation of time and pressure to the disappearance of astringency.

In the second place, the fact was established that nonastringency ensues the more rapidly, the longer the exposure to CO_2, though this in itself is not sufficient to bring about the result. Pressures of 45 and 75 lbs. were used, the treatments being for 3, 6, 9 and 12 hours. After a pressure of 45 lbs. applied for 3 hours, nonastringency ensued in from 71 hours (for orange-colored fruits) to 192 hours (for yellow and green fruits). After 6 and 9 hours exposure, 45 hours were required, the evidence being that the period was somewhat less for the longer exposure. After 12 hours, the fruit became nonastringent in something over 18 hours. After 75 lbs. pressure, nonastringency was effected in a somewhat shorter period, but in view of the possible significance of the quantitative relations indicated above, but little difference should be expected between the results caused by 45 and 75 lbs. After 3 hours exposure, nonastringency followed in 62 to 185 hours; after 6 hours in something over 34 hours, after 9 hours less

than 34 hours, and after 12 hours in about 20 hours. In the receiver charged for 12 hours, however, the pressure fell from 75 to 50 lbs., so that no difference worthy of note may be seen as between this and the corresponding experiment for 45 lbs. The difference in effect of the 6 and 9 hour exposures was very small with both 45 and 75 lbs. pressure, a fact which I am unable to elucidate. Aside from this, the period required for becoming nonastringent was, roughly speaking, in inverse ratio to the time of exposure to the gas. It will be readily understood by those who have worked with such objects as ripening fruits that it is often difficult to fix upon a suitable indicator of the final limit of any of the physiological processes involved. Thus, in these experiments just described, the difference in rate of change in green and orange-colored fruits makes it difficult to decide on what is to be regarded as the final point at which nonastringency ensues. Furthermore, there is the more variation between different fruits the longer the period of ripening, and the end point is correspondingly difficult to fix.

I have, therefore, endeavored to apply a test different from that of tasting, at least for purposes of control. The mucous membranes are of course extremely sensitive; nevertheless, it becomes difficult, as the end point is approached, to judge clearly. It is furthermore of the highest importance to examine the physical characters of the tannin-mass, which has been shown to be a colloidal complex,[8] in order to determine whether the condition reached by it when nonastringency has been accomplished quickly is identical with that reached after a slow process. A former study of the reaction of alkaloids[8] with the tannin-mass showed me that as nonastringency is approached, the coarsely granular precipitate gives way to an increasingly finer one, so that an ultramicroscopic and eventually an amicroscopic suspensoidal condition is reached. The only change obvious on applying the reagent then becomes one of color, the tannin-mass becoming brown, lighter brown, darker and paler yellow as the definitive state is approached. By reflected light the changes are evident as a decreasing milkiness.[9] By correlating these progressive changes with the disappearance of astringency, it has become evident that it is quite possible to decide whether a fruit is astringent or not without tasting it. This is because the physical condition of the tannin-mass is the same on the arrival of nonastringency, whether this has been accomplished in 15 hours or as many days.

There remains one further point of which to speak. When one uses such an expression as "the period required to become nonastringent," an incorrect notion may be implied. It is not to infer that in one case the process itself is slow and in another rapid (though this may be the case), but that the time required to start the process may differ. It remains to determine the actual fact, and this is necessary to an understanding of the whole matter.

Note.—The work, of which the above is a partial account, was done at the Alabama Agricultural Experiment Station as an Adams Fund Project. I have to thank Dr. F. A. Wolf for hearty and arduous cooperation in carrying on the experiments.

Francis E. Lloyd

McGill University

[8] Lloyd, F. E., "The Tannin-colloid Complexes in the Fruit of the Persimmon," *Biochemical Bulletin*, 1: 7, September, 1911.

[9] These changes are analogous to those seen first by Loew and others, and recently described in detail by Czapek. Czapek, F., "Ueber Fällungsreactionen in lebenden Pflanzenzellen und einige Anwendung derselben," *Ber. deut. bot. Ges.*, 38: 147–159, 1910.

THE AMERICAN PHYSIOLOGICAL SOCIETY

The society held its twenty-fifth annual meeting in Cleveland, Ohio, December 29, 1912, to January 1, 1913. Sixty-nine members were in attendance. Two executive sessions and six scientific sessions were held, two of the latter being joint sessions, one each with the American Society of Biological Chemists and Section K of the American Association for the Advancement of Science. The joint session with the American Society of Biological Chemists was opened with exercises in memory of the late Waldemar Koch. After the

members of the society had arisen as a token of respect to the memory of Dr. Koch, Dr. A. P. Mathews delivered the memorial address.

The following papers and demonstrations, forty-seven in all, were read and discussed:

S. Simpson: "The Rate of Growth in the Dog."

G. N. Stewart: "Further Observations on the Blood-flow in Man."

J. A. E. Eyster and W. J. Meek: "Experiments on the Sinus Region of the Mammalian Heart."

G. C. Robinson (by invitation) and J. A. Auer: "Cardiac Anaphylaxis as Shown by the String Galvanometer."

W. T. Porter: "The Functional Relations of Cells in Nerve Centers."

R. S. Lillie: "Correlation between the Anti-stimulating Action and the Anti-cytolytic Action of Anesthetics."

E. B. Meigs: "Studies in the General Physiology of Smooth Muscle."

W. P. Lombard: "The Tickle Sense."

O. Folin, W. B. Cannon and W. Denis (by invitation): "A New Colorimetric Method for the Determination of Epinephrin."

J. Auer and S. J. Meltzer: "The Splanchnic as a Depressor Nerve."

F. R. Miller: "The Salivary Secretion Centers in the Medulla."

W. T. Porter: "A New Electrical Clock."

S. P. Beebe: "A New Form of Apparatus for Artificial Respiration."

A. D. Hirschfelder: "Some New Apparatus."

L. Loeb: "The Influence of Pregnancy on the Cyclic Changes in the Uterus."

G. Lusk: "Metabolism of a Dwarf."

H. S. Gasser (by invitation) and A. S. Loevenhart: "The Mechanism of Stimulation by Oxygen Want."

T. B. Osborne and L. B. Mendel: "Feeding Experiments Relating to the Nutritive Value of the Proteins of Maize."

A. J. Ringer: "The Fate of Fatty Acids in Diabetic Organisms."

A. B. Macallum and W. R. Campbell: "On the Secretion of Pure Acid by the Kidney" (with demonstration).

D. Marine: "Hypertrophy and Hyperplasia of the Parathyroid in Birds."

G. H. Whipple: "Hematogenous Jaundice and its Relation to the Liver."

E. V. McCollum: "The Influence of the Plane of Protein Intake on Nitrogen Retention in the Pig."

R. S. Hoskins: "Relation of Fatigue Metabolites to Epinephrin Efficiency."

D. R. Hooker: "Perfusion of the Respiratory Center in Frogs; the Influence of Calcium and Potassium on the Respiratory Rhythm."

A. Hunter: "The Nitrogen Excretion of Normal and of Thyroidectomized Sheep."

A. L. Tatum (by invitation): "Studies in Experimental Cretinism with Suggestions as to a Biological Test for Thyroid Secretion."

R. A. Gesell (by invitation): "The Relation of Pulse Pressure to Renal Secretion."

C. Brooks and A. B. Luckhardt: "The Arterial Blood Pressure during Vomiting."

T. Sollmann and J. D. Pilcher (by invitation): "The Effects of Aortic Compression on the Circulation."

E. G. Grey (by invitation) and A. D. Hirschfelder: "Clinical Observations upon the Carbon Dioxide Percentage of Alveolar Air."

C. W. Greene and W. Y. Skaer (by invitation): "On the Fat Contents of the Mammalian Gastric Glands in Relation to the Stages of Digestion."

S. Tashiro (by invitation): "The Chemical Change in Nervous Tissue during Excitation."

I. F. Zucker (by invitation): "The Pressor Property of Shed Blood."

H. Cushing, L. H. Weed (by invitation) and C. Jacobsen: "Further Studies on the Rôle of the Pituitary Gland in Carbohydrate Metabolism, with Special Reference to the Autonomic Control of the Posterior Lobe Secretion."

S. A. Matthews and D. D. Lewis (by invitation): "The Pars Intermedia; Its Place in Diabetes Insipidus."

Lydia M. Degner (by invitation) and A. E. Livingston (by invitation): "Effects of Thyroidectomy and Castration, respectively, on the Pituitary in the Rabbit."

P. W. Cobb and L. R. Geisler (by invitation): "The Influence on Foveal Vision of the Brightness of Surroundings."

D. E. Jackson: "Some Observations on the Peripheral Action of certain Drugs."

G. L. Kite (by invitation): "The Relative Permeability of the Surface and the Interior Portions of the Cytoplasm of Animal and Plant Cells."

J. D. Pilcher (by invitation): "The Excretion of Nitrogen Subsequent to Ligation of Successive Branches of the Renal Arteries."

W. E. Burge: "The Uniform Rate of Destruc-

and Surgeons; H. G. Barbour, Yale Medical tion of Ptyalin and Pepsin by the Electric Current.''

G. H. Whipple: ''Intestinal Obstruction; Study of a Toxic Substance Present in the Intestinal Mucosa.''

S. J. Meltzer: ''Is the Pulsation of the Anterior Lymph Hearts Responsible for the Action of some Drugs in Cardiectomized Frogs?''

H. McGuigan: ''The Synergic Action of Morphine and Strychnine.''

Symposium: ''Some Recent Applications of Physical Chemistry in Biology.''

(*a*) A. B. Macallum: ''Surface Tension.''

(*b*) L. J. Henderson: ''The Control of Neutrality in the Animal Body.''

The following eleven papers were read by title:

C. D. Snyder: ''The Influence of Temperature on the Mammalian Heart.''

M. Dresbach (by invitation): ''A Bloodless Method of Recording Blood Pressure in Animals.''

A. J. Carlson: ''Some Observations on the Physiology of the Empty Stomach and Esophagus in Man and Dog.''

H. C. Bradley: ''The Problem of Enzyme Synthesis.''

G. W. Crile: ''The Relation between the Physical State of the Brain Cells and Brain Functions —Experimental and Clinical.''

Y. Henderson and C. T. Flynn (by invitation): ''Oligemia in Acute Disease.''

H. McGuigan: ''The Secondary Depression by Epinephrin; the Rate of Destruction of the Pressor and the Hyperglycemia Actions of Epinephrin.''

W. B. Wherry (by invitation): ''On the Transformation of Amebæ into Flagellates and Vice Versa.''

P. E. Howe (by invitation) and P. B. Hawk: ''The Influence of Fasting on the Creatine Content of Muscle.''

C. D. Snyder: ''A Study of the Electromyograms.''

A. J. Carlson: ''The Correlation of the Physiological States of the Thyroid of the Fetus and of the Mother.''

The following persons were elected to membership in the society: G. C. Robinson, Rockefeller Institute; J. D. Pilcher, P. J. Hanzlik, R. S. Pearce, Western Reserve Medical School; G. C. Schneider, Colorado College; A. H. Ryan, University of Pittsburgh; M. Dresbach, Cornell University; G. Bachmann, Atlanta College of Physicians School; W. B. MacNider, University of North Carolina; A. R. Moore, University of California; H. B. Williams, Columbia University; V. H. K. Moorhouse, Washington University.

At this meeting considerable progress was made toward the formation of a close federation of the American Physiological Society, the American Society of Biological Chemists and the American Society for Pharmacology and Experimental Therapeutics. The society expressed its desire to enter into such a federation, and a committee was appointed to confer with similar committees of the sister societies with a view to bringing it about. The committee was granted power to make the arrangements for the next annual meeting. This committee was also directed to confer with a similar committee of the American Society of Naturalists to consider the advisability of establishing closer relations with that society.

With regard to the measures of remedying the threatening congestion of programs that were referred to the council at the last annual meeting, it was decided that should the federation of the three societies be accomplished, the secretaries of the federated societies be empowered to attempt the equalization of the programs of the three societies by placing papers on the program of the society to which its subject is most closely related. It was also decided to place at the end of the program papers presented by non-members, and in the event of congestion of the program, to read these by title.

The following officers were elected for the year 1913:

President—S. J. Meltzer, New York.

Secretary—A. J. Carlson, Chicago.

Treasurer—Joseph Erlanger, St. Louis.

Additional Members of the Council—W. B. Cannon, Boston; F. S. Lee, New York.

The following members of the society were appointed by the president to form the editorial committee on the publication of the *American Journal of Physiology* for 1913: A. T. Porter, A. J. Carlson, Joseph Erlanger, W. H. Howell, F. S. Lee, Graham Lusk, S. J. Meltzer.

The local committee on entertainment, following the plan that was first tried last year at Baltimore by the members and friends of the society, again agreed to dispense with all private entertainment, and to substitute for it informal subscription dinners followed by smokers each evening while the society was in session. These functions were open to all members and guests of the societies of the experimental biological sciences. It was again

demonstrated that this method of entertainment, by bringing all of the members together under conditions permitting of informal discussion and exchange of ideas, adds greatly to the pleasure and value of the meeting.

JOSEPH ERLANGER,
Acting Secretary
WASHINGTON UNIVERSITY MEDICAL SCHOOL

THE ASSOCIATION OF AMERICAN GEOGRAPHERS

THE Association of American Geographers held its ninth annual meeting at New Haven, Connecticut, December 27–28, 1912. The sessions were held in Lampson Hall, Yale University, and an informal meeting took place Friday evening at the Graduates' Club. In the absence of the president (Professor Salisbury), Mr. M. R. Campbell, the first vice-president, presided. About thirty members attended.

It is gratifying to the members to see the increasing number of papers on anthropogeography, regional geography, and climatology that deal with human relations, a feature less prominent in the earlier programs of the association. Seven purely physiographic papers were presented out of a total of sixteen. Great interest is manifested in the *Annals* of the association since the appearance of the first volume during the past year. The publication committee has performed a distinct service to geographic science in securing papers of high quality and a volume of excellent appearance.

The newly-elected officers for 1913 are as follows:

President—Henry G. Bryant.
First Vice-president—Ellsworth Huntington.
Second Vice-president—Charles C. Adams.
Secretary—A. P. Brigham.
Treasurer—F. E. Matthes.
Councillor (for three years)—R. DeC. Ward.

The publication committee appointed for two years (1913 and 1914) consists of R. E. Dodge, editor, and Alfred H. Brooks, H. E. Gregory and H. H. Barrows.

ISAIAH BOWMAN,
Acting Secretary, Session of December, 1912

THE CONVENTION OF THE AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS

THE sixth annual convention of the American Society of Agricultural Engineers was held at the Great Northern Hotel, Chicago, December 26, 27 and 28. The attendance of members was very good, but the noticeable feature this year was the unusually large number present of manufacturers, designers, etc. This is very encouraging to the officers and shows that the work of the society is being kept practical enough to interest the commercial man.

Thursday afternoon was devoted largely to general agricultural machinery interests. Mr. Sjogren, of the University of Nebraska, presented a paper on "Tests of Corn Planters," which gave the results of a series of tests run on accuracy of drop. Professor C. A. Ocock, of the University of Wisconsin, in his paper on "Draft of the Plow," showed by tables and curves, the variations in the draft of a plow as affected by width, depth, type of moldboard and condition of soil. In the paper on "Isolated Gas-lighting Plants" Mr. Eugene Becker, of the Atlantic Blau-Gas Company, described the different systems using gasoline gas, acetylene and Blaugas, with the advantages and disadvantages of each. Admixture of a certain proportion of air made either of these gases explosive, either a richer or leaner mixture being non-explosive: gasoline—2 per cent. to 5 per cent. by volume of gasoline vapor—98 per cent. to 95 per cent. air; acetylene—2 per cent. to 49 per cent. by volume acetylene—98 per cent. to 51 per cent. air; Blaugas—4 per cent. to 8 per cent. by volume Blaugas—96 per cent. to 92 per cent. air. Thus acetylene has a very wide explosive range, Blaugas next, and gasoline least. On the point of quality of light, acetylene is the best, but for convenience and safety Blaugas was probably most satisfactory.

Friday was devoted to the tractor and standardization questions. In his paper on "Testing of Gas Tractors" L. W. Chase, of the University of Nebraska, reviewed the results secured through the Winnipeg Motor Contests. C. F. Hirschfeld, of Cornell University, in a paper on "Principles of Fuel Oil Engines" explained the matter of carburetion of various fuel oils, the principles and chemistry of their combustion and the difficulties met in adapting them as fuels for internal combustion engines. E. H. Ehrman, of the Chicago Screw Company, in his paper on "The Standardization Work of the Society of Automobile Engineers," gave the society an account of the methods and guiding principles for the standardization work of his society. The influence of standardization in cheapening production and repairs and in keeping down monopoly was brought out in

"Standardization in Agricultural Engineering" by J. B. Davidson, of Iowa State College. This subject was continued by "Standards in Agricultural Machinery," by J. A. King, of Sears, Roebuck and Company. W. J. Brandon, of the Avery Company, in his paper, "Standards in Gas Tractor Construction," took up the question of standardization as applied to the gas tractor industry.

Saturday was set aside for papers along the teaching phase of the work. A paper by Daniels Scoates, of the Mississippi Agricultural College, on "Laboratory Exercises in Farm Machinery," brought out the fact that the subject naturally divides into farm mechanics, farm motors and farm machinery. "The Design of an Agricultural Engineering Building," by H. C. Pamsower, took up the design of a proposed building for the Ohio State University. The plans as shown were discussed by E. A. White, of the University of Illinois, and J. L. Mowry, of the University of Wisconsin.

The committee on the proposed Bureau of Agricultural Engineering reported through J. B. Davidson that the society should lend all possible aid towards securing the passage of the Rainey bill in its present form, providing the creation of a Bureau of Farm Power, inasmuch as parts of the work proposed to be included in the wider plan is already partly taken care of under different bureaus and there would be great opposition towards making the necessary reorganizations.

Extensive changes were authorized in the constitution of the society, especially as to classes of members, qualifications of members, methods of electing members, and in dues. The intention is to make the requirements for active membership more rigid, but to provide a wider range of membership through associates, juniors and affiliates. Originally composed of college men engaged in the teaching of agricultural engineering subjects, the society has been broadened to include manufacturers, technical men, etc. The increase in membership has been rapid, that of the present year being between forty and fifty per cent.; while under the new provisions of the constitution, and due to the increased interest aroused by the standardization and tractor contest problems, a still greater increase is looked for in the present year.

The following officers were elected for the ensuing year:

President—L. W. Chase, Lincoln, Neb.

First Vice-president—E. A. Rumely, La Porte, Ind.

Second Vice-president—J. A. King, Chicago, Ill.

Secretary—I. W. Dickerson, Urbana, Ill.

Treasurer—J. L. Mowry, St. Paul, Minn.

Councilor—J. B. Davidson, Ames, Ia.

I. W. Dickerson,
Secretary

SOCIETIES AND ACADEMIES

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

The 464th regular meeting of the society was held at 4:30 P.M., December 17, 1912, in Room 43 of the New National Museum, the president, Mr. Stetson, in the chair.

Professor C. V. Piper read a paper on the Filipinos and the problem of their government, beginning by a general résumé of the insular conditions and various peoples dwelling there, of whom he said the Negritoes, now found mainly in four islands but once in nearly all, are generally regarded as the original inhabitants, the Igorrotes and other wild tribes being the next to arrive, the Filipinos next, perhaps about A.D. 500, and the Moros last, not long before the time of the Spanish occupation. At some length he described the Filipino characteristics, distinguishing between the small educated minority and the majority of ignorant laborers. His conclusion was that immediate independence would be injurious, but that our government should establish some limit in the future defined by conditions of education of the majority of the race. The most remarkable thing we are doing there, he said, is the attempt, for the first time in history, to educate an inferior people *en masse*. The Asiatic European colonies have little faith in its success, but are influenced by it and our general policy.

Dr. Riley B. Moore read a paper on his observations in St. Lawrence Island, one hundred by thirty miles of treeless swamp and tundra, inhabited by some two hundred and fifty people, the débris of five different tribes in the Bering Sea. Some of these resemble Sioux Indians: others are typical Mongolians, with all intervening kinds. In summer they have a profusion of birds and fish to feed on; but in other seasons their food is whale-meat, seal-meat and walrus-meat. They live with little ventilation and many skin diseases. Tuberculosis also is very common. The death rate has long exceeded the birth rate.

W. H. Babcock
Secretary